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COMPLETE GUIDE TO

SHORT-WAVE AND CITIZENS BAND RADIO

By Michael Kurland

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1. Introduction

On December 12, 1901, Guglielmo Marconi sat in a little shack in Newfoundland with a pair of earphones on his head. At a pre-arranged time an operator in Cornwall, England, transmitted the three dots of the Morse letter S into the air. The signal spanned the Atlantic ocean, Marconi was just able to hear it above the natural static, and the age of radio was born.

On Christmas Eve, 1906, the experimental radio station of Professor Fessenden at Brant Rock, near Boston, broadcast music for the first time.

In 1909 the steamship **Republic** collided with the **Florida,** and Radio Officer Jack Binns of the **Republic** sent the first SOS, the international call for help.

These are but a few of the many "firsts" of radio broadcasting that have helped turn it into the complex industry that we know today. Since these firsts, the use of radio for pleasure, for business and for aid in disaster has grown until the production of electronic communications equipment today is a billion-dollar industry and the use of this equipment is an accepted and indispensable asset to our civilization.

This guidebook will concentrate on the non-professional aspects of radio communications: short-wave listening (SWL), Citizens Band Radio (CB) and amateur radio or "ham." Two of these are as old as the field of radio communications itself.

SWL, which originally stood for short-wave listening, now includes all forms of radio listening except listening to local commercial radio stations, which is considered a form of entertainment altogether different from a hobby. The original SWLers, back in

the early 1900's, sat for hours over their crystal sets listening to the spark-gap dots and dashes of the ship-to-shore wireless. Their grandchildren now sit for hours over superheterodyne short-wave receivers listening to news broadcasts from Budapest or the beeps of artificial satellites in orbit around the Earth.

Amateur or "ham" radio, the only hobby besides collecting machine guns for which you need a Federal license, is as old as radio itself. Some amateurs consider Marconi to have been the first ham. A surprising amount of the technical advancement in radio communications has come about as a result of the experimenting of these dedicated amateurs. The use of the "skip" characteristics of certain short-wave frequencies for long-distance radio communication was discovered by hams allotted this previously useless frequency range by the Federal Communications Commission.

Citizens Band Radio, which allows certain assigned frequencies to be used by untrained citizens for their own private purposes, exists because the sophistication of radio equipment allowed the simplification of the use of this equipment. People with no training in or prior knowledge of radio can now use the Citizens Band for their own personal or business needs. Since the opening of the class D Citizens Band in 1958 the FCC has issued almost three quarters of a million licenses for the private use of this band.

Radio communications is a constantly growing field, affording many commercial uses and much private enjoyment. We hope that you will find this book a useful guide to some of its more interesting aspects.

2. Short Wave Listening

Sit down at your short-wave receiver one evening at 8 PM, Eastern Standard Time. Tune your set to 6070 kilocycles on the 40-Meter band. If you have been precise, and receiving conditions are good, you will hear **Radio Sophia** broadcasting an English-language news program from the capital of Bulgaria. Or turn on your high-frequency converter for the 108-140 megacycle range and listen to the beeps and clicks of an Explorer or Tiros satellite passing overhead.

SWLing brings the world into your room. The captains of two charter boats in the Carribean discussing fishing conditions; an amateur radio operator in Sidney, Australia, talking to K2US, the ham station of the World's Fair in New York City; rescue operations for a flood in the South Pacific or a sinking ship in the Arctic; you can become the silent partner in these and a countless variety of other activities.

Equipment

Any standard short-wave receiver tunable from the broadcast band through 30 megacycles is usable for short wave listening. The price range on these sets is from about 30 to several thousand dollars. It stands to reason that the more money you spend for a piece of equipment, the better that equipment will function, but it is not necessary to invest a lot of money to enjoy this hobby. A set within the 60 to 200 dollar price range will be more than adequate.

What you pay for in the more expensive sets is increased sensitivity and selectivity. Sensitivity refers to the ability of the equipment to pick up weak signals; selectivity refers to the ability to discriminate, to separate two signals that are very close together in freqency.

It does not always require a more sensitive or selective set to pick up a signal being broadcast from a distant point. A distant transmitter might actually have a stronger signal when you receive it than a local one. This depends on the power (measured in watts) of the originating signal and on the prevailing atmospheric conditions. You might find one day that a signal originating in Germany is coming in loud and clear, when you can't even hear a signal being broadcast twenty miles away.

Commercial receivers for the short-wave bands can be bought in radio parts supply stores and in any store that handles amateur radio equipment. Some of these stores have mail-order catalogs, which can be obtained

by replying to advertisements in any of the monthly electronics or amateur radio magazines. There are many reputable manufacturers whose names might be unfamiliar to you as they specialize in this sort of equipment rather than broadcast-band receivers. Some of the respected brand names in the field are: **Hammarlund, National, Lafayette, Hallicrafters** and **Collins**; there are many others.

Kits

Some manufacturers offer their equipment in both prebuilt and kit form. Building the kit yourself, besides being a rewarding experience, will save you about twenty per cent of the prebuilt price. For more information on kit building, see page 113.

Antennas

Your short-wave receiver will have to have an antenna. Your choice of antennas is going to be dictated partly by where you live; if you live in the country you may be able to erect any sort of antenna you please, while if you live in a city apartment you might find yourself unable to hang even a short wire out your window.

The antenna input connections on your receiver will probably have either two or three terminals. If two, one will be marked A and the other G; if three, two will be marked A and the third G. The A stands for antenna, and the G for ground. With a one-wire lead in from your antenna, connect the wire to a terminal marked A and, if you have three terminals, make an electrical connection between the other two by twisting a length of wire over both screw heads. With a two-wire lead in, connect to both A terminals if you have three, or to both the A and G terminal if you have only two. In any case, the lug marked G may be grounded by running a wire from it to a hot water pipe, a radiator or similar object. A ground connection can be provided by a metal rod three feet long hammered into the ground.

The simplest antenna is a length of wire attached to the antenna input and sort of draped around the room. This will work; sometimes an antenna as primitive as this can have surprisingly good reception. One step above this is the permanent around-the-room antenna. A length of bell wire is tacked above (or below) the

baseboard all around the room, and one end is fed into the antenna input. This operates fine as long as you don't live in a building with a steel framework.

The simplest version of permanent outdoor antenna is a length of wire between 50 and 75 feet long strung in a clear space. It should be at least 25 feet off the ground, but there is no upper limit—the higher the better. The two ends of the antenna should be separated from their poles (or trees) by glass or porcelain insulators, and the antenna lead-in wire attached to one end. It would probably be a good idea to affix a lightning arrester to the lead-in wire at the point that it enters the house. This will avoid possibility of damage to the equipment during an electrical storm. Remember that the arrester has to be grounded to do any good; the package the arrester comes in will give complete instructions on how to make an adequate ground.

There are many more expensive antenna systems, but it would be a good idea to wait until you know just what phase of SWL interests you most before you invest in one. There are directional antennas, rotary antennas, cut frequency antennas and broadband antennas; just which one would suit you and how much you want to spend for it is a decision that isn't necessary to make immediately. One of the antennas already described will do well to acquaint you with the pleasures of short-wave listening.

If you are having any trouble with local electrical disturbances—those little clicks, buzzes and hums that come between you and what would otherwise be a good signal—try using a shielded antenna lead-in wire. This is cable with a single wire through the center and braided wire around it. The single wire connects to the antenna and the antenna connection on your receiver, it brings the signal in; the braided wire is grounded and takes care of some of those clicks and buzzes.

How To Listen

The most valuable instruction you can have in regard to short-wave listening is: **slow and easy**; this is one field where patience is indeed a virtue. If you tune through the short-wave bands with the same casual attitude that is usually given to the broadcast-band you will never hear many of the stations that you could pick up with careful tuning.

The basic technique is to turn the tuning dial very slowly and carefully through the band. The volume should be turned up high enough to pick up any signal that might be buried in the noise (noise is defined as anything but the signal; static, diathermy machine or spark plug interference etc.) but not all the way; some signals come in so loud and clear that they would blast you out of your seat if the volume were up all the way. When you come across a signal that you might want to listen to, you can adjust the volume to the particular demands of that signal, but before you start searching again remember to turn it back to the halfway point.

You will find that wearing earphones will help you understand those distant, delicate signals that are the most difficult to pull in—and therefore the most enticing to listen to. Earphones will bring the sound di-

rectly to your ear, reducing the volume level necessary to listen and thus the amount of static that is brought along with the signal. They will also cut out the extraneous room noises that distract you from listening to loudspeakers. Incidently, unless other members of your family are sympathetic with your hobby, a private room might also help cut down extraneous room noises.

Keeping a Station Log

It will be very useful to your future listening pleasure if you start keeping a log of the stations you hear from the very first. The essential information is the identity of the station (if it can be determined), the type of programming, the frequency and the time. This log can then be referred to in the future to aid in finding those seldom-heard difficult stations. Although the exact format is, of course, up to you, a typical station log might look like this:

Time	Frequency	Station	Programming	Comments
1900	9833	Budapest radio	music	Hungarian dance music, very nice.
1930	9575	Rome	English-language news	very poor reception.
2010	9212	?	English-sports	A soccer game, probably South American.

Notice that time records are kept on what is known as a 24-hour clock. The day starts one second after midnight; therefore two o'clock in the afternoon is 1400. It is also standard practice to keep these records in Greenwich Mean Time, rather than local time. This provides for universality of records from place to place, and also equalizes differences in local time, such as the shift from Eastern Standard to Daylight Saving Time.

G.M.T. Conversions for North America

Greenwich Mean Time	0100	
Eastern* Standard	2000	(8 p.m.)
Central* Standard	1900	(7 p.m.)
Mountain* Standard	1800	(6 p.m.)
Pacific* Standard	1700	(5 p.m.)

***To convert to Daylight Saving Time in the area, simply add one hour.**

It's very useful in SWL operations to be able to tell what the time is in various countries you might be listening to. The COUNTRY TIME CHART (chart #1) is made so that it can be cut out of the handbook, mounted on cardboard, and placed somewhere close to your receiver. You will find it a valuable aid in your station identification procedure.

Morse Code

A lot of the signals that you will hear on the air will be in Morse code. This is still used because it will travel a much greater distance understandably than voice communication. Morse will cut through static that would drown other voice signals of the same strength.

A knowledge of Morse code will greatly increase your listening pleasure. It takes time and effort to learn, but speed and ability will increase greatly with practice.

If you are interested in learning Morse code, the section in this book on the subject will give you all the information you need.

QSL's

QSL's are cards or letters sent by broadcasting stations to verify the claim of a listener after he has submitted satisfactory proof of actually receiving the station. Many short-wave listeners find the collection of QSL cards a fascinating adjunct to their hobby.

In order to get a QSL from a station it is necessary for you to give the station certain information. This information should include:

1. The frequency—as closely as you can measure it. If the station is running more than one frequency, it would be appreciated if you include

ENGLISH LANGUAGE BROADCASTS

COUNTRY	STATION	FREQUENCY (kc)	TIMES (EST)
Australia	Melbourne	17,840, 15,220	2030, 2130
		9580	2230, 0745
Bulgaria	Sofia	9700, 6070	1900, 2000
			2300
Canada	Montreal	15,190, 11,760,	1800 (east)
		9585	0215, 0300 (west)
China	Radio Peking	9480	2000
Congo	Brazzaville	15,190	1400
	Leopoldville	11,755	1630, 2100, 2230
Cuba	Radio Havana	6135	2200
Czechoslovakia	Prague	11,905, 9795, 9550	2030, 2330
		7345, 5930	
Denmark	Copenhagen	15,165,	0700,
		9520	2100
Ecuador	Quito (HCJB)	15,115, 11,915,	1730
		9745, 6050	
Finland	Helsinki	15,185	1530 (Mon. & Fri.)
West Germany	Radio Deutche-Welle (Cologne)	11,945, 11,795,	1010
		9735	
		9545, 6075	2035
		9735, 9575, 6145	2400
		6075	
Great Britain	BBC-London	17,890	1130
		17,695	0945
		15,420	1100
		15,300	1030
		9580	1530
		7120	0130
		6195	1400
		3975	2400
Ghana	Radio Ghana (Accra)	11,800	2050
		6070	2000
Hungary	Radio Budapest	9833, 7215,	1930, 2030, 2200
		6234	2330
Israel	Tel Aviv	9009	1500
Italy	Radio Roma	11,905, 9575	1930, 2205

all you can hear.

2. Signal strength. There are several ways to report this, which will be discussed later. If you can get more than one frequency of the same transmission, a comparative report would be helpful.

3. Program. This is for verification purposes. Give a brief resume of what you hear, with the time to the closest minute of the start (or end) of each item reported. (For American stations, give the time in their local reckoning, if you know it; if not, give the time in your local time—be sure to clearly indicate which. For foreign stations give the time report in GMT.)

4. Your equipment. This is optional, but it would be of interest to the station receiving it. This includes the type of receiver you are using, the antenna system you have, your location and the weather in your area at the time you received the signal.

Remember that no station is under any sort of obligation to send you a QSL. Type up a neat letter with all

COMMONLY HEARD IN NORTH AMERICA

COUNTRY	STATION	FREQUENCY (kc)	TIMES (EST)
Ivory Coast	Radio Abidjan	11,820	1330
Japan	Radio Japan (Tokyo)	15,205, 15,175	1830
		11,780	
Jordan	Radio Amman	9560	2000
Lebanon	Beirut	11,890	1630
Netherlands	Radio Nederland	17,810, 15,445	1030 (Tues. & Fri.)
	(Hilversum)	11,950, 9590	1415 (Tues. & Fri.)
		7125, 6085	1630 (weekdays)
		6035, 5985	2030 (weekdays)
New Guinea	Port Moresby (Vlt 6)	6130	0200
New Zealand	Radio New Zealand	11,780, 9540	0130
	(Wellington)		
Portugal	Emissora Nacional	6185, 6025,	2100
	(Lisbon)	9740	
Roumania	Radio Bucharest	9590, 9570, 9510,	2030
		7225, 7195, 6190,	
		6150	
Sierra Leone	Freetown	3316	0200
South Africa	Radio South Africa	9525	2200
	(Paradys)		
Spain	Radio Nacional de	9360, 6130	2215, 2315, 0015
	Espagna (Madrid)		
Sweden	Radio Sweden	17,845, 15,240	0900
	(Stockholm)	9660	1915, 2215
		6065, 5990	2045
Switzerland	Radio Switzerland	15,315	0945
	(Berne)	9665, 9535, 6165	2030
Turkey	Radio Ankara	7285	1600
U.S.S.R.	Radio Moscow	9740, 9730, 9700,	1730, 1900, 2000,
		9680, 9660, 9650,	2100, 2300, 0040
		9620, 9610, 9570,	
		7320, 7310, 7240,	
		7200, 7150	
Vatican City	Vatican Radio	9645, 7250, 6145	1950
Windward Islands	St. Georges,	5010	1500
	Grenada	3280	1730

the information you have gathered, and suggest that the station send you a verification. **Always be sure to include return postage!** If the station you are QSLing is in a foreign country, you can obtain an International Reply Coupon (IRC) from your post office. They cost 15 cents, and are good for first class single-letter postage in most parts of the world.

There are several different systems used to report signal strength and readability. The most common are:

1. **QSA — R.** Or, sometimes, just **Q — R.** QSA is the term for signal strength, and is read 1 to 5; R is readability and is measured 1 to 9. Recently the letter S is being used instead of **R,** but the meaning is still the same. A report of a fine signal would now read **Q5 S9.**

2. The 555 code. This is a code that the British Broadcasting Corporation asks its regular monitors and listeners to use. It looks like this:

Signal Strength	Interference	Overall Merit
0. Inaudible	0. Total	0. Unusable
1. Poor	1. Very severe	1. Poor
2. Fair	2. Severe	2. Fair
3. Good	3. Moderate	3. Good
4. Very good	4. Slight	4. Very good
5. Excellent	5. None	5. Excellent

3. The **SINPO** code. This is the most recent code to come into common use. **Radio Japan** and many other short-wave stations are requesting their listeners to report in this code. It is a good one to adopt for your own use. Here it is:

S	I	N
Signal Strength	Interference	Atmospheric Noise
1. Barely audible	1. Extreme	1. Extreme
2. Poor	2. Severe	2. Severe
3. Fair	3. Moderate	3. Moderate
4. Good	4. Slight	4. Slight
5. Excellent	5. None	5. None

P	O
Propagation Disturbance	Overall Merit
1. Extreme	1. Unusable
2. Severe	2. Poor
3. Moderate	3. Fair
4. Slight	4. Good
5. None	5. Excellent

A report in the **SINPO** code for a station that is being received very well should read: **SINPO** 55555, and **not** S5I5N5P5O5.

You can use any of the reporting codes that you like, but try to be fair in your evaluation of a station's signal; the stations use your reports to tell how effective their transmitting equipment is in reaching your part of the world.

INTERNATIONAL RADIO CALL-IN PREFIXES

AAA-ALZ	United States
AMA-AOZ	Spain
APA-ASZ	Pakistan
ATA-AWZ	India
AXA-AXZ	Austria
AYA-AZZ	Argentina
BAA-BZZ	China
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco
COA-COZ	Cuba
CPA-CPZ	Bolivia
CQA-CRZ	Portuguese Colonies
CSA-CUZ	Portugal
CVA-CXZ	Uruguay
CYA-CZZ	Canada
DAA-DTZ	Germany
DUA-DZZ	Philippines

Amateur Radio Listening

If you would like to increase your QSL collection by getting some from distant ham radio stations that you've heard, you can request a QSL from them just as you did from the commercial stations.

The ham radio operator would probably be glad to hear from you; it supplies additional evidence of how well his ham gear is working. **Remember,** a ham radio operator is a person pursuing a private hobby—he does not get paid to be on the air. Do not expect him to reply to your request for a QSL unless you have included return postage.

Satellite Monitoring

The telemetry signals of both the American and Russian satellites can be monitored by the SWL fan. It is a great thrill to hear the beeps of a Tiros or Explorer satellite as it passes overhead, but don't expect to be able to make any sense out of the signal. The beeps supply information to computers about the conditions either inside the satellite or around it.

Soviet satellites are probably easier for the average SWL to receive, as one of their signals is broadcast within the range of the average shortwave receiver. This is on a band between 19,900 kc and 20,010 kc.

American satellites broadcast on a much higher frequency range, lying either around 108 mc. or between 136-137 mc. Most sets require a special converter to receive in this band.

EAA-EHZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	U.S.S.R.
ELA-ELZ	Liberia
EMA-EOZ	U.S.S.R.
EPA-EQZ	Iran
ERA-ERZ	U.S.S.R.
ESA-ESZ	Estonia
ETA-ETZ	Ethiopia
EUA-EWZ	U.S.S.R.
FAA-FZZ	France
GAA-GZZ	United Kingdom
HAA-HAZ	Hungary
HBA-HBZ	Switzerland
HCA-HDZ	Ecuador
HEA-HEZ	Switzerland
HFA-HFZ	Poland
HGA-HGZ	Hungary
HHA-HHZ	Haiti
HIA-HIZ	Dominican Republic
HJA-HKZ	Colombia
HLA-HMZ	Korea
HNA-HNZ	Iraq
HOA-HPZ	Panama
HQA-HRZ	Honduras
HSA-HSZ	Thailand
HTA-HTZ	Nicaragua
HUA-HUZ	El Salvador
HVA-HVZ	Vatican City
HWA-HYZ	France
HZA-HZZ	Saudi Arabia
IAA-IZZ	Italy
JAA-JSZ	Japan
JTA-JVZ	Mongolian Republic
JWA-JXZ	Norway
JYA-JYZ	Jordan
JZA-JZZ	New Guinea
KAA-KZZ	United States
LAA-LNZ	Norway
LOA-LWZ	Argentina
LXA-LXZ	Luxembourg
LYA-LYZ	Lithuania
LZA-LZZ	Bulgaria
MAA-MZZ	United Kingdom
NAA-NZZ	United States
OAA-OCZ	Peru
ODA-ODZ	Lebanon
OEA-OEZ	Austria
OFA-OJZ	Finland
OKA-OMZ	Czechoslovakia
ONA-OTZ	Belgium
OUA-OZZ	Denmark
PAA-PIZ	Netherlands
PJA-PJZ	Netherland Antilles
PKA-POZ	Indonesia
PPA-PYZ	Brazil
PZA-PZZ	Surinam
QAA-QZZ	**International Abbreviations**
RAA-RZZ	U.S.S.R.
SAA-SMZ	Sweden
SNA-SRZ	Poland
SSA-SSM	Egypt
SSN-STZ	Sudan
SUA-SUZ	Egypt
SVA-SZZ	Greece
TAA-TCZ	Turkey
TDA-TDZ	Guatemala
TEA-TEZ	Costa Rica

TFA-TFZ	Iceland
TGA-TGZ	Guatemala
THA-THZ	France
TIA-TIZ	Costa Rica
TJA-TJZ	Camerom
TKA-TKZ	France
TSA-TSZ	Tunisia
TTA-TTZ	Chad
TUA-TUZ	Ivory Coast
TVA-TXZ	France
TYA-TYZ	Dahomey
TZA-TZZ	Mali
UAA-UQZ	U.S.S.R.
URA-UTZ	Ukrainian S.S.R.
UUA-UZZ	U.S.S.R.
VAA-VGZ	Canada
VHA-VNZ	Australia
VOA-VOZ	Canada
VPA-VSZ	British Colonies
VTA-VWZ	India
VXA-VYZ	Canada
VZA-VZZ	Australia
WAA-WZZ	United States
XAA-XIZ	Mexico
XJA-XOZ	Canada
XPA-XPZ	Denmark
XQA-XRZ	Chile
XSA-XSZ	China
XTA-XTZ	Upper Volta
XUA-XUZ	Cambodia
XVA-XVZ	Vietnam
XWA-XWZ	Laos
XXA-XXZ	Portuguese Colonies
XYA-XZZ	Burma
YAA-YAZ	Afghanistan
YBA-YHZ	Indonesia
YIA-YIZ	Iraq
YJA-YJZ	New Hebrides
YKA-YKZ	Syrian Republic
YLA-YLZ	Latvia
YMA-YMZ	Turkey
YNA-YNZ	Nicaragua
YOA-YRZ	Rumania
YSA-YSZ	El Salvador
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ZBA-ZJZ	British Colonies
ZKA-ZMZ	New Zealand
ZNA-ZOZ	British Colonies
ZPA-ZPZ	Paraguay
ZQA-ZQZ	British Colonies
ZRA-ZUZ	Republic of South Africa
ZVA-ZZZ	Brazil
2AA-2ZZ	United Kingdom
3AA-3AZ	Monaco
3BA-3FZ	Canada
3GA-3GZ	Chile
3HA-3UZ	China
3VA-3VZ	Tunisia
3WA-3WZ	Vietnam
3XA-3XZ	Guinea
3YA-3YZ	Norway

COUNTRY TIME CHART

All times are given on the 24-hour clock as of when it is 12 noon GMT. For daylight saving time simply add one hour.

COUNTRY	TIME
GMT	1200
Aden	1500
Afghanistan	1630
Alaska	0400
Albania	1300
Algeria	1300
Argentina	0900
Australia	
New South Wales, Queensland, Victoria, Tasmania	2200
North Territory	
South Australia	2130
West Australia	2000
Austria	1300
Bahamas	0700
Barbados	0800
Belgium	1400
Bermuda	0800
Bolivia	0800
Brazil	
Eastern	0900
Manaos	0800
Acre	0700
Bulgaria	1400
Burma	1830
Cambodia	1900
Canada	0830
Newfoundland, Labrador, Nova Scotia, Quebec	0800
Ontario	0700

3ZA-3ZZ	Poland
4AA-4CZ	Mexico
4DA-4IZ	Philippines
4JA-4LZ	U.S.S.R.
4MA-4MZ	Venezuela
4NA-4OZ	Yugoslavia
4PA-4SZ	Ceylon
4TA-4TZ	Peru
4UA-4UZ	United Nations
4VA-4VZ	Haiti
4WA-4WZ	Yemen
4XA-4XZ	Israel
4YA-4YZ	International Aviation
4ZA-4ZZ	Israel
5AA-5AZ	Libya
5BA-5BZ	Cyprus
5CA-5GZ	Morocco
5HA-5IZ	Tanganyika
5JA-5KZ	Colombia
5LA-5MZ	Liberia
5NA-5OZ	Nigeria
5PA-5QZ	Denmark
5RA-5SZ	Malagasy Republic
5TA-5TZ	Mauritania
5UA-5UZ	Niger
5VA-5VZ	Togo Republic
5WA-5WZ	Western Samoa
5XA-5XZ	Uganda
5YA-5ZZ	Kenya
6AA-6BZ	Egypt
6CA-6CZ	Syria
6DA-6JZ	Mexico
6KA-6NZ	Korea
6OA-6OZ	Somali Republic
6PA-6SZ	Pakistan
6TA-6UZ	Sudan
6VA-6WZ	Senegal
6XA-6XZ	Malagasy Republic
6YA-6YZ	Jamaica
6ZA-6ZZ	Not Allocated
7AA-7IZ	Indonesia
7JA-7NZ	Japan
7RA-7RZ	Algeria
7SA-7SZ	Sweden
7TA-7YZ	Algeria
7XA-7XZ	Algeria
7ZA-7ZZ	Saudi Arabia
8AA-8IZ	Indonesia
8JA-8NZ	Japan
8SA-8SZ	Sweden
8TA-8YZ	India
8ZA-8ZZ	Saudi Arabia
9AA-9AZ	San Marino
9BA-9DZ	Iran
9EA-9FZ	Ethiopia
9GA-9GZ	Ghana
9HA-9JZ	Not Allocated
9KA-9KZ	Kuwait
9LA-9LZ	Sierra Leone
9MA-9MZ	Malaya Federation
9NA-9NZ	Nepal
9OA-9TZ	Leopoldville
9UA-9UZ	Burundi
9XA-9XZ	Rwanda

COUNTRY	TIME
Manitoba	0600
Alberta	0500
Br. Columbia	0400
Yukon	0300
Ceylon	1730
China	2000
Colombia	0700
Congo, Rep. of	
Leopoldville	1300
Elisabethville	1400
Congo Rep.	1300
Costa Rica	0600
Cuba	0700
Curacao	0730

COUNTRY	TIME
Cyprus	1400
Czechoslovakia	1300
Dahomey	1300
Denmark	1300
Dominican Republic	0700
Ecuador	0700
Egypt	1400
El Salvador	0600
Ethiopia	1500
Falkland Island	0800
Faeroes Island	1200
Fiji Island	2400
Finland	1400
France	1300
Germany	1300

COUNTRY	TIME
Gibraltar	1300
Gilbert Island	2400
Ghana	1200
Greece	1400
Great Britain	1200
Greenland—Thule	0800
Angmagssalik	1000
Guadeloupe	0800
Guam	2200
Guatamala	0600
British Guiana	0815
Dutch Guiana	0830
French Guiana	0800
Guinea	1200
Haiti	0700
Hawaii	0200
Honduras	0600
Hong Kong	2000
Hungary	1300
Iceland	1100
India	1730
Indonesia	
North Sumatra	1830
Java, Borneo, Bali	1930
Celebes	2000
Iran	1530
Iraq	1500
Ireland	1200
Israel	1400
Italy	1300
Ivory Coast	1200
Jamaica	0700
Japan	2100
Jordan	1400
Kenya	1500
Korea	2100
Kuwait	1500
Laos	1900
Lebanon	1400
Liberia	1115
Libya	1400
Luxembourg	1300
Madagascar	1500
Malaya	1930
Mali	1200
Malta	1300
Marshall Island	2400
Martinique	0800
Mexico	0600
Monaco	1300
Outer Mongolia	2000
Morocco	1200
Mozambique	1400
Nepal	1740
Netherlands	1300
New Caledonia	2300
New Guinea	2200

COUNTRY	TIME
New Hebrides	2300
New Zealand	2400
Nicaragua	0600
Nigeria	1300
Norfolk Island	2330
Norway	1300
Pakistan—West	1700
East	1800
Panama	0700
Papua	2200
Paraguay	0800
Persia	1530
Peru	0700
Philippines	2000
Poland	1300
Portugal	1200
Puerto Rico	0800
Rhodesia	1400
Rumania	1400
Samoa	0100
Sarawak	2000
Saudi Arabia	1500
Senegal	1200
Seychelles	1600
Siam	1900
Sierra Leona	1200
Singapore	1930
Solomon Islands	2300
Somalia	1500
Union of South Africa	1400
Spain	1300
Sudan	1400
Surinam	0830
Sweden	1300
Switzerland	1300
Syria	1400
Tanganyika	1500
Tahiti	0200
Tasmania	2200
Thailand	1900
Trinidad	0800
Tunisia	1300
Turkey	1400
Uganda	1500
Uruguay	0900
U.S.S.R.	
Moscow	1500
Sverdlovsk	1700
Tashkent	1800
Vatican	1300
Venezuela	0730
Vietnam	2000
Virgin Islands	0800
Windward Island	0800
Yeman	1500
Yugoslavia	1300
Zanzibar	1500

3. The Citizens Band

What is CB?

In 1958 the Federal Communications Commission altered the then-existing regulations for the Citizens Radio Service. They divided the 11-meter amateur radio band into 23 channels and allocated it for class D Citizens Band use.

In the six years since the opening of the 11-meter band for Citizen's Radio Services, over 700,000 requests for licenses in the band have been granted by the FCC, and over one and a half million CB two-way radios have been put to use in this band.

There are several reasons for this sudden growth of interest in the class D Citizens Band. The Federal license requirements for this band are very simple and easily met. The compactness and ease of operation of the equipment allows it to be used for many purposes. Also, due to the specific band requirements and the mass manufacturing of the equipment, the cost is quite low compared to communications equipment for other uses.

The Citizens Band is divided by the FCC into four classes, A, B, C and D. CLASS A: The FCC assigns a specific frequency to each station under a class A license. Because of the Ultra-High Frequency range allocated to class A operation, equipment for this use is fairly expensive; therefore the band is used almost exclusively by commercial operators.

Information on the telemetry frequencies of American satellites can be obtained from the newspapers shortly after the satellites are launched, or up-to-date listings can be found in the various electronics magazines. The frequencies of the Russian satellites are broadcast periodically over Radio Moscow.

The apparent frequency of the satellite will change as the satellite approaches and passes the observer. This is due to the Doppler effect, the same effect that causes the whistle of an approaching train to go down in pitch as it gets nearer. You will be able to hear the change in the tone of the satellite's signal caused by this effect.

WWV

The National Bureau of Standards in Washington, D. C. runs a radio station with the call-sign WWV. This station broadcasts a time signal twenty-four hours a day and, if noth-

REGENCY Range Gain Transceiver, with Double Sideband Reduced Carrier. $269.95

ing else, is fine for setting your wristwatch. The broadcast is simultaneous on 2500, 5000, 10,000, 15,000 and 25,000 kilocycles. The broadcasting frequency is excellent for calibrating your receiver, it is accurate to within one part in 10 billion. Every five minutes the exact time in EST is given in voice, and GMT is given in code.

At 19 and 49 minutes past the hour a propagation report is given in Morse code, using the letters N for normal, U for unsettled, and W for useless, followed by a number from 1 to 9. Thus N9 would mean that excellent receiving conditions exist.

Monitor Registration Certificates

Popular Electronics Magazine, besides running a monthly column of information of interest to the SWL, has begun a program of issuing Monitor Registration Certificates to people interested in short-wave listening in any form. They also issue a personal identification sign, similar to that issued to radio hams by the FCC. If you are interested in the program, get a current copy of the magazine and see what their requirements are. This magazine will also have a list of SWL clubs in your area where you can meet and exchange information with others interested in this hobby.

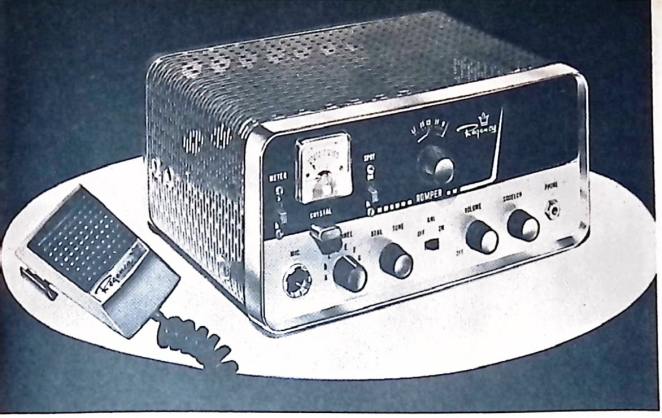
Call-Signs

If you hear the call-sign of a station, you can always tell what country the station is operating from. The call-signs have been allocated by block to the various countries of the world by international agreement. The call-sign list that follows should enable you to identify any call you hear. Good hunting!

CLASS B: Class B operation is restricted to one frequency in the UHF band—465 mc. Allowed to operate with a maximum power output of 5 watts and a maximum antenna height of 20 feet above the base, class B equipment has a very limited range. Interest in the use of this channel is not excessive.

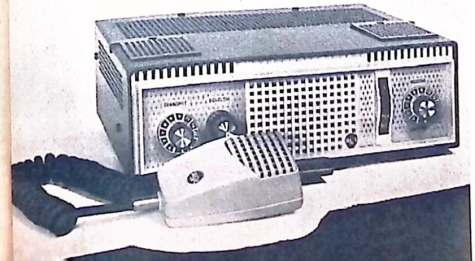
CLASS C: This class of operation is set up to allow for the radio control of equipment. The use varies from garage doors to model airplanes. More about class C later.

CLASS D: The new class that was set up in 1958, class D is intended for either business or personal use. Class



REGENCY Romper. $179.95

R. C. A. Mark VIIII



R. C. A. Mark VIII

D has been allocated 23 channels from 26.965 to 27.255 megacycles for crystal controlled operation. It is the most useful, the most popular and the least expensive of the four classes of Citizens Radio Service operation. The license for class D operation is easy to obtain, and, under certain conditions, a license is not even necessary. Radio communication under class D operation is possible at distances of up to 30 miles.

FREQUENCIES OF CITIZENS BAND CHANNELS

CLASS D

CHANNEL NO.	FREQUENCIES (megacycles)
1	26.965
2	26.975
3	26.985
4	27.005
5	27.015
6	27.025
7	27.035
8	27.055
9	27.065
10	27.075
11	27.085
12	27.105
13	27.115
14	27.125
15	27.135
16	27.155
17	27.165
18	27.175
19	27.185
20	27.205
21	27.215
22	27.225
23	27.255*
24	26.995
25	27.045
26	27.095
27	27.145
28	27.195
(23)	27.255*

* shared frequency

Uses of the Citizens Band

Class D Citizens Band has a variety of business applications. It is used by repairmen between the store and the truck; by commercial firms between the office and the salesman's car; and between store or factory and the delivery truck. Its potential uses are limited only by the imaginations of the users.

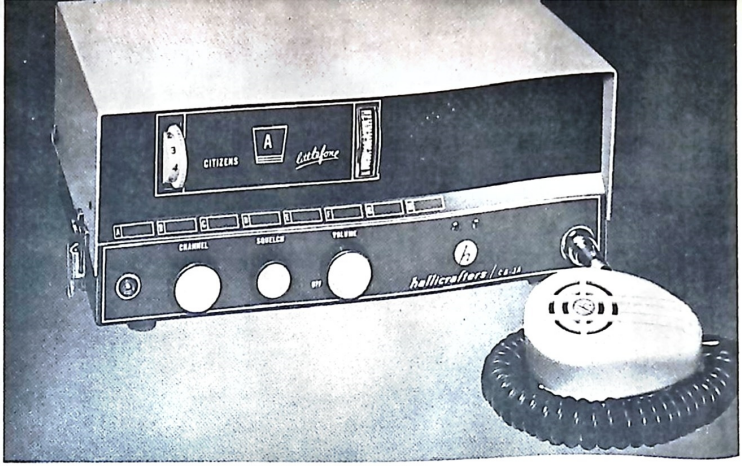
There are also an endless number of personal uses to which CB can be put. It is in constant use between the private home and the car, boat or even airplane as a valuable adjunct to regular marine or aviation radio. Besides using it from vehicle to home, it can also be used to contact CB-equipped hotels, restaurants or repair stations along any route of travel.

Many professional people, such as doctors or lawyers, who find it necessary to be in almost constant touch with the office have found Citizens Band radio to be of invaluable aid.

Regulations Concerning the Citizens Band

The Citizens Radio Service operates under the regulations of the Federal Communications Commission, an agency of the United States government. The FCC was established as an independent regulatory agency, reporting directly to Congress, by the Communications Act of 1934.

The FCC is charged with the responsibility of seeing that the radio frequencies are used in the best interests of the public. For this reason the FCC insists that the rules for CB



HALLICRAFTERS CB-3A Transceiver

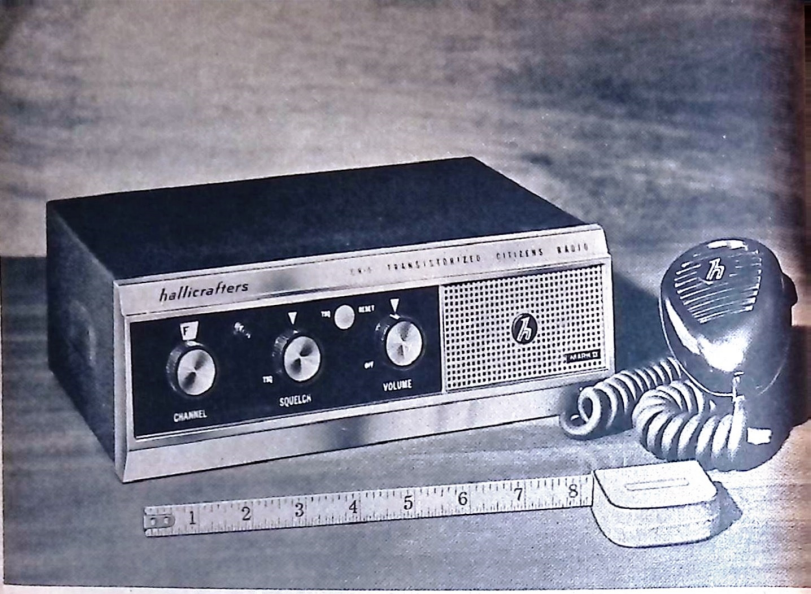
radio, although liberal, be strictly observed.

Before you go on the air with your CB license, you are required to read and understand the provisions of a **current copy** of Part 95, the Citizens Radio Service Rules and Regulations. These regulations can be obtained by sending $1.25 to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

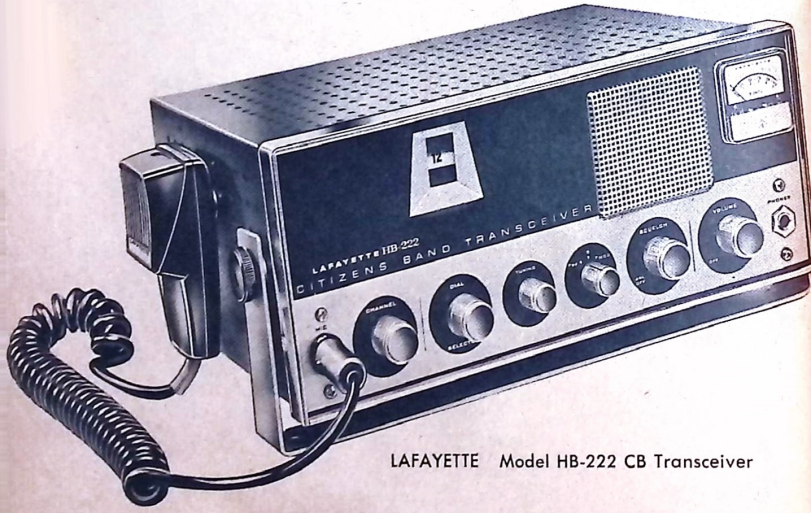
If you are a citizen of the United States, at least 18 years old (at least 12 years old for Class C), and your application meets the requirements of Part 95, you are eligible for a Citizens Radio Service license. If you happen to be a corporation, partnership, trust, association or other entity, governmental or private (Civil Air Patrol or Boy Scouts, for example) that meets the FCC's definition of citizenship—as prescribed in the Communications Act of 1934—you are also eligible for such a license.

Class B, C, or D Citizens Band station licenses are applied for on FCC form 505 (form 400 for Class A), and this form **must** be used; any applications not on this form (and the latest version of it—as revised May 1963) will be returned with no action of any sort having been taken. This is also the form that must be used for all further communication with the FCC in regard to your Citizens Band license. Form 505 is filled out to record change of address, change in number of transmitters, application for a duplicate license to replace one that's been lost, and just about anything else that may come up. An $8 filing fee must accompany your application.

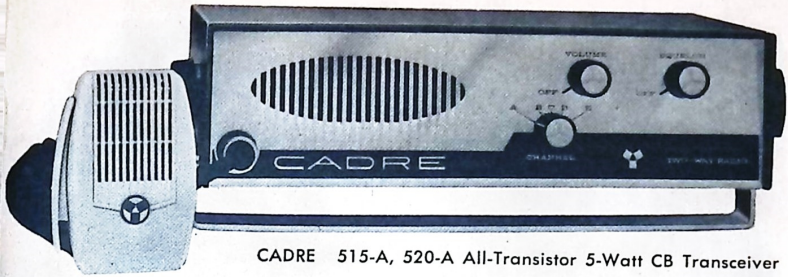
If you are a citizen, are over the age limit, and have filled out the form 505 to the satisfaction of the FCC, they will send you your Class D license. This will be good for five years from the date of issue, unless you move. On the license form will be the call-sign to be used on the air to identify your station. Don't pester the FCC with a request for a specific call-sign, they are so busy checking and granting applications that they are unable to heed special requests.



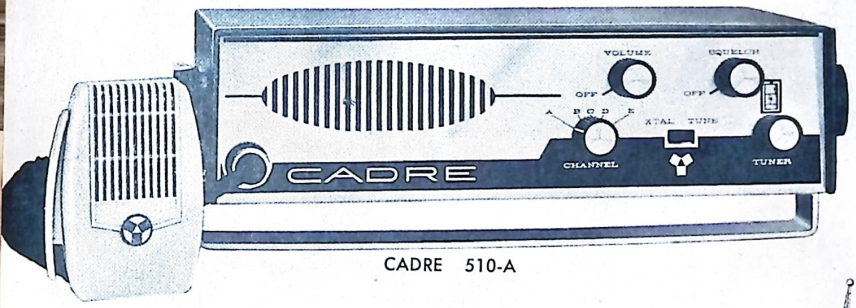
HALLICRAFTERS CB-5 Mark II Transistorized Transceiver



LAFAYETTE Model HB-222 CB Transceiver

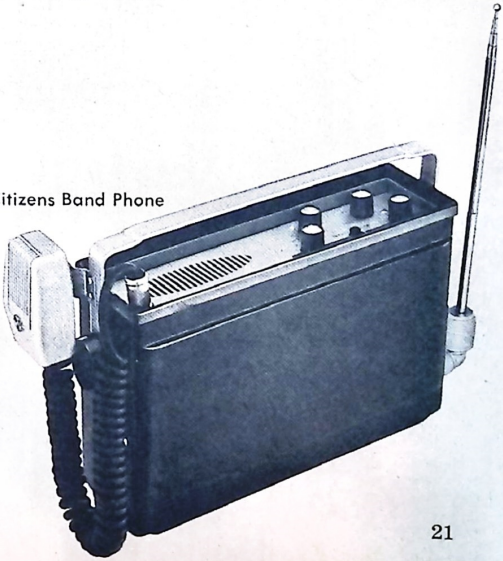


CADRE 515-A, 520-A All-Transistor 5-Watt CB Transceiver



CADRE 510-A

CADRE 5-Watt Portable Citizens Band Phone



TRAM Model TR-27E 23-Channel CB Base Station

When you get your license, post it somewhere around your main station. All auxiliary transmitters should have a **Transmitter Identification Card** (FCC Form 452-C) or a photostatic copy of the station license attached somehow to them. Most manufacturers include the card with the equipment, and extra copies can be picked up at any FCC regional office.

When you apply for your CB license, it is a good idea to have your equipment already picked out, if not bought, and also to have a fairly clear idea of how many transceivers you will be using in your system; there are questions on both of these points in the Form 505.

The completed Form 505 is mailed to:

FEDERAL COMMUNICATIONS COMMISSION
Gettysburg, Pennsylvania
17325

Once you have your license you must keep the FCC informed of any proposed change in the information you supplied on the Form 505. This includes: any change of address of the station licensee; any increase in the total number of transmitters authorized; any other change affecting the terms of the authorization for the station involved. The FCC must be notified and authority obtained **before** you go on the air with any such change, and you must forward your old license to the FCC immediately upon receipt of the new one.

Any station in the CB is authorized to communicate with any other station in the Band, **but not with stations in any other class of radio communications.**

Transmissions are to be short and to the point; the Citizens Band is not set up to allow casual conversations, DX'ing, or other unnecessary communications.

The 23 channels in Class D Citizens Band are to be shared equally at all times. This means that any user of

THE TEN CODE

A partial list of the most useful numbers

10-1	I am receiving you poorly.
10-2	I am receiving you well.
10-3	Stop transmitting.
10-4	OK. Acknowledge. Affirmative.
10-5	Relay this message.
10-6	I am busy, please stand by.
10-7	I am leaving the air.
10-8	I am back on the air, and standing by.
10-9	Please repeat the last message.
10-10	My transmission completed, I'm standing by.
10-11	Please speak more slowly.
10-13	Please advise on weather and road conditions.
10-19	Please return to base.
10-20	What is your location? My location is - - - - .
10-21	Please call - - - - by telephone.
10-22	Please report in person to - - - - .
10-23	Please stand by.
10-24	Have you finished? I have finished.
10-25	Do you have contact with - - - - ?
10-35	Confidential information.
10-36	Correct time.
10-41	I am changing to channel - - -. Please change to channel - - - .

the service can broadcast on any of the channels at any time. You must tolerate interference from other users of the Band, just as they must tolerate you. On Class C or D operations, you can always turn to one of the other channels available to you if the one you're on is excessively crowded.

EQUIPMENT

Receivers and Transmitters

There is a wide variety of equipment designed for use on the Class D Citizens Band. It varies greatly in size, price and quality. The equipment you choose will depend mainly on the use you intend for it and the amount you wish to pay.

For two stationary transceivers to be used at the maximum distance (due to the 5-watt restriction on Class D transmitter, this distance is about 30 miles for land-based sets), receiver sensitivity is the most important factor. Size and weight make little difference, and transmitter power output is limited to 5 watts. For mobile operation, size, weight and ruggedness of equipment become very important. If, for example, you wish to install a transceiver in a private plane along with the conventional aircraft radios, weight becomes a primary factor.

One of the important considerations affecting the price of the unit you buy is the number of channels you wish to have immediately available. The more channels you can use just by flicking a switch on your transceiver, the better the chance of finding a channel that is free of interference, and the more expensive the unit.

The receiver in your CB unit is actually of greater importance than the transmitter. All Citizens Band transmitters are limited by the FCC to an output power of 5 watts, not exceptionally high power for a radio transmitter; so the sensitivity and selectivity of your receiver can make the difference between owning a use-

TRAM Model TR-70B Mobile CB Station

ful Citizens Band transceiver or having merely an expensive toy.

The most successful radio receivers are of the superheterodyne type with either dual-conversion or two stages of single conversion circuitry. You might also look for a **squelch** circuit, designed to eliminate background noise and only allow signals of over a certain strength to activate the receiver. With any type of mobile operation, a noise-limiting circuit that will surpress ignition and other electrical static is essential.

Microphones

The choice of microphones for use with Citizens Band equipment is not critical. An audio bandwidth of from 300-3000 cycles is sufficient for clearly understanding speech. Full-fidelity reproduction of speech is actually undesirable, as it increases the bandwidth needed to transmit the signal and also the possibility of distortion. Therefore any type of microphone may be used.

For a mobile application you will probably want a hand-held microphone, for a base station you may choose a desk model; this is, of course, up to the individual.

Antennas

The FCC regulations state that the output power of the CB transmitter cannot exceed 5 watts. Therefore, the better this power can be utilized by the antenna, the stronger the signal will be on the air. The antenna is the one variable in the CB system.

The FCC regulations concerning antennas reads:

An antenna at a fixed location to be used by a Class B, Class C, or Class D mobile station shall not exceed 20 feet in height above any man-made structure or natural formation on which it is mounted except that when mounted on an existing antenna structure of another station the antenna shall not exceed the height of that antenna structure.

FCC Antenna Rules,
Part 19, 19.25 (C)

What this amounts to is that your antenna cannot be more than twenty feet higher than the pre-existing structure it is erected on, always supposing that you are not erecting it on another antenna tower. For best results it would behoove you to take full advantage of this regulation and erect your antenna a full twenty feet off the highest structure around.

It is also important to take the local terrain into account when erecting your antenna. The **actual** antenna height (height in a straight line from the ground to your antenna) is not as important as the **effective** antenna height. The effective antenna height is a measure of how high the antenna is above the average level of the surrounding terrain. The higher your effective height is, the more distance you're going to be able to get out of your unit.

The antenna should be mounted where it is not near any obstacles which approach it in height. It should be well clear of power lines, trees, chimneys or buildings.

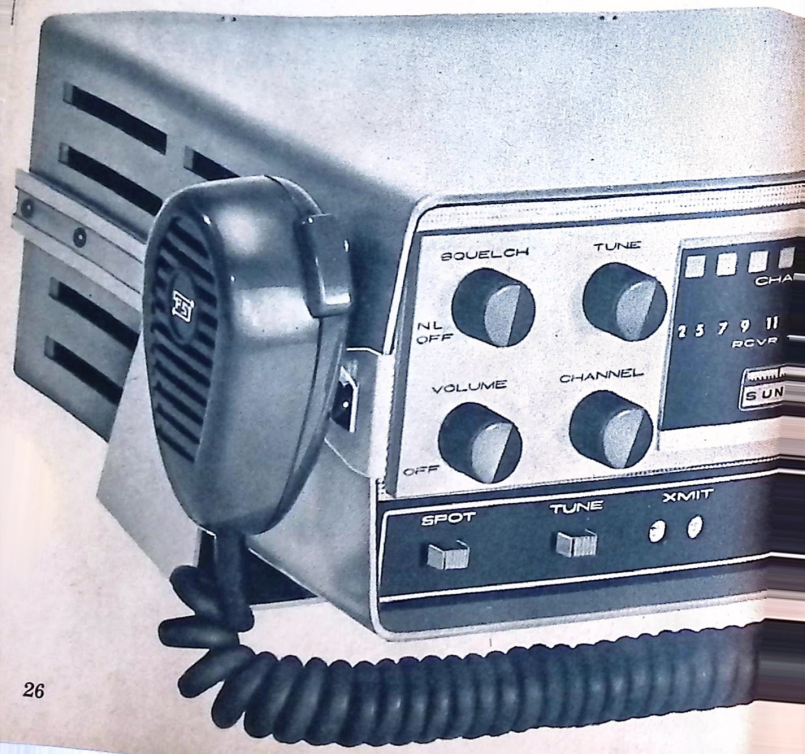
The final consideration in placing the antenna is that it should be as close to the transmitting/receiving equipment as is practical. The coaxial cable used as antenna lead-in does

GLOBE No. 65-220 Master CB Transceiver

GLOBE President VIII, No. 65-228

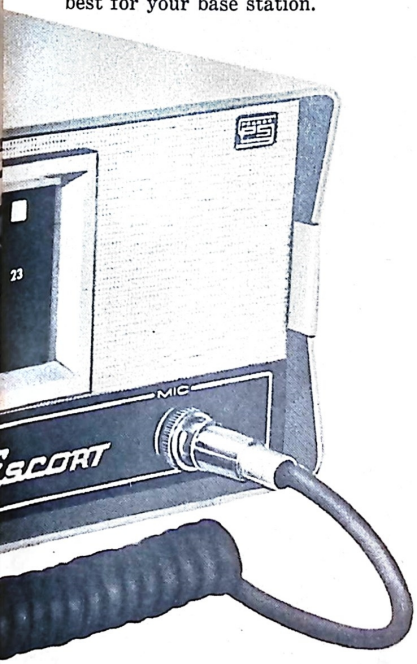
GLOBE The Globe-Star CB Transceiver

GLOBE The Globe-Star CB Transceiver



have some power loss, so the lead-in distance should be kept as short as possible to minimize this loss.

The type of antenna you get depends on the type of service you need from your Citizens Band equipment. If you're looking for point-to-point service, from one fixed station to another (office to home, or factory, for example), then a highly directional antenna would be advantageous. If you are broadcasting from a fixed station to one-or-more mobile stations, a non-directional antenna—one that radiates power equally in all directions—should be used. Since your mobile stations (cars, boats etc.) will probably have whip antennas, which are vertically polarized, a vertical ground-plane antenna will be best for your base station.



PEARCE-SIMPSON Escort CB Transceiver.

Polarization refers to the position of the radiating part of an antenna in relation to the ground. Vertical polarization is straight up and down, at a 90-degree angle to the earth. Horizontal polarization is parallel to the surface of the earth (like the horizon). Vertical polarization is usually utilized for Citizens Band radio, as most CB installations are mobile. Television antennas are horizontally polarized.

For mobile installations, the type of antenna on the vehicle is fully as important as the antenna at the base station. For non directional results, an antenna mounted directly at the center of the roof would be best. This, however, has several disadvantages; installation becomes a problem, and the height of the antenna combined with the height of the car's roof is enough to make tree branches and low bridges a hazard.

A second method is bumper installation. However, mounting a whip antenna on a bumper causes the antenna to become directional across the plane of the car. That is: if the antenna is mounted on the right rear bumper, the directional pattern will be across the car toward the left front; conversely, if the antenna is mounted on the left rear bumper, it will be directional toward the right front of the car. This is because the car acts as a "ground plane" for the antenna.

The most efficient length for an antenna is directly related to the wavelength of the signal being broadcast or received. (See: Meters into Kilocycles and Related Information, Chap. 6.) For the Citizens Band Class D wavelength of 27+ megacycles, the length of a full-wave antenna comes out to about 36.4 feet. Most antennas are quarter-wave, luckily for car installations, and this comes out to slightly under nine feet. The optimum length for a Citizens Band antenna is usually figured as 103 inches. Even this distance can be shortened by a technique known as coil or base loading. This is the installing of an inductance at the bottom end of the antenna in series with the radiating element.

Power Supply

Most CB equipment comes equipped to be run either from house current or six- or-twelve volt automobile batteries. There are usually two different sets of plugs, clearly marked, for the two purposes. The instructions included with the equipment will give specifications for the correct methods of installation.

Some units come with a completely self-contained power supply, complete with batteries. Most of these are equipped to be recharged by plugging into a standard ac wall socket overnight.

Procedures

There are certain specific operating procedures that are standard in Citizens Band operations. Some of them exist to comply with the FCC regulations, the rest are just common courtesy and efficiency of operation.

The most important things to remember when using the Citizens Band are:

1. At the beginning and end of each complete transmission a full station identification (call-sign) must be given by both sides of the transmission.

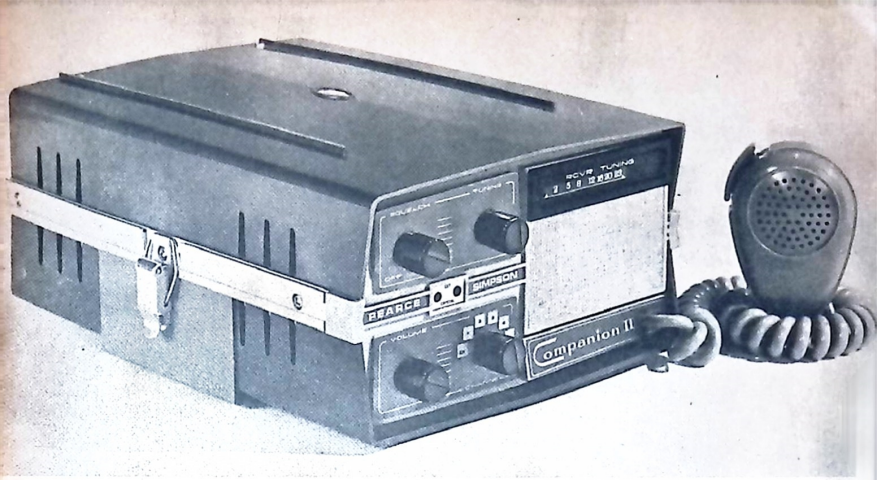
2. Maximum transmission time between two CB stations for any one call-up is restricted to five minutes by FCC regulation. If you have more information to transmit, you must allow a two-minute break between the end of a five-minute conversation and the next call-up.

3. Do not transmit if you can hear other stations using the channel. Wait until they have signed off before beginning your transmission.

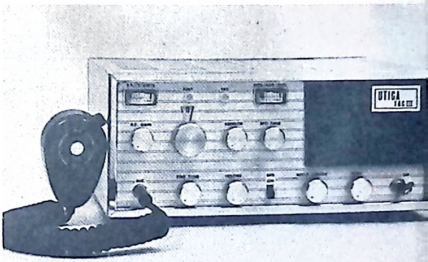
4. Limit your conversation to the shortest practical time you need to conduct your business. If possible make use of the brief ten-code for speed and clarity.

The "break-break" has become an accepted method of interrupting a transmission already in progress in order to transmit emergency traffic. It works this way:

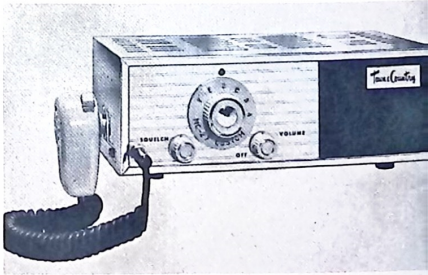
If you have something of extreme importance to transmit and your channel is being used you wait for one of the two parties talking to say "over." Before the other party has a chance to answer you break into the channel. The party who was to have answered the "over" call will acknowledge your breaking in, and you then



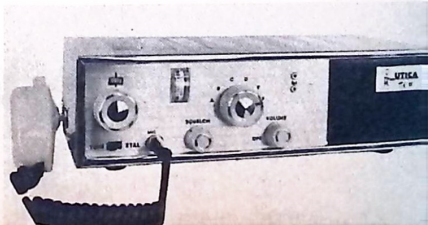
PEARCE-SIMPSON
Companion II "two-way radio" $189.50



UTICA T & C III,
23-Channel Transceiver. $259.95

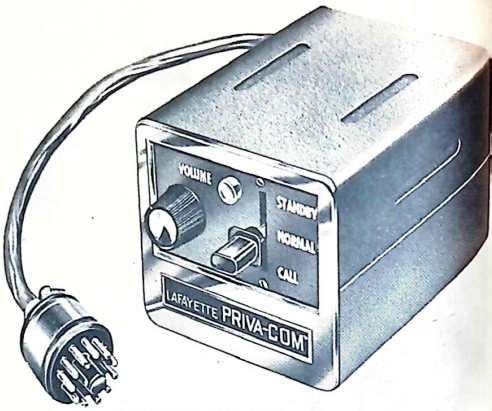


UTICA Town & Country
6-Channel CB Transceiver. $142.50

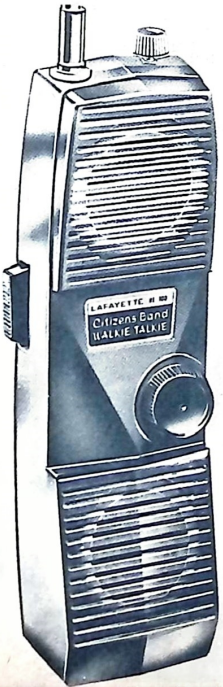


UTICA Town & Country II,
6-Channel Transceiver. $162.50

CADRE C-75 Hand-held Transceiver; weighs under two pounds

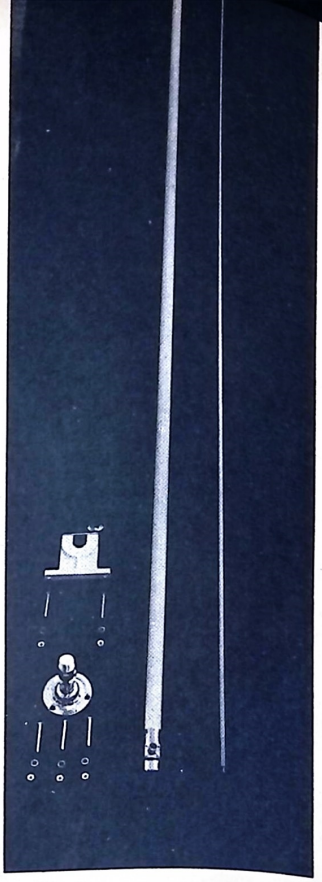


LAFAYETTE HA-100 Encoder-Decoder "Privacom". Designed for use in the Citizens Band Radio Service, the HA-100 will permit your transceiver to receive signals only when activated by a two-tone code sent out by another, similarly equipped transceiver.



LAFAYETTE HE-100 CB Part 15 Transceiver

WONDERSHAFT Fiberglass Model 10-3 ¼-Wave CB Antenna



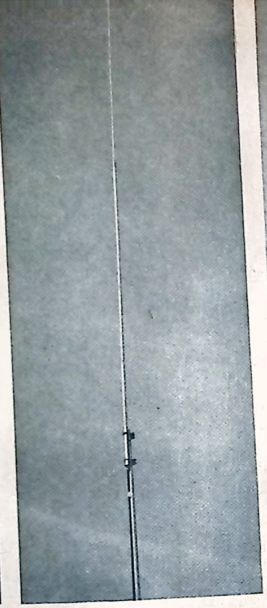
WONDERSHAFT Fiberglass Model 176-1 CB Marine Antenna

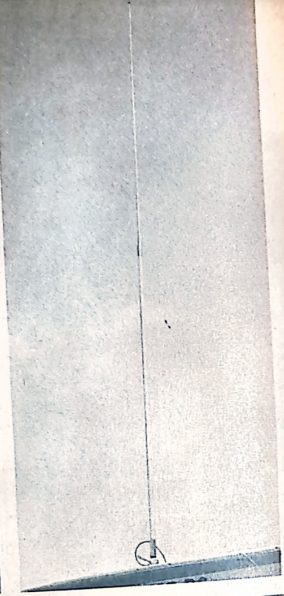
make your request for transmission time. The parties you have interrupted will usually accept your request and sign off, at which time you can place your call.

The so-called ten-code is a brevity code used in Citizens Band transmissions. There are other radio services that use a ten-code, but the code numbers have a different significance on these channels. The ten-code is used because it shortens transmission time and helps eliminate errors in the information transmitted as it is easy to understand even under crowded or noisy conditions.

Part 15

Part 15 of the Regulations of the Federal Communications Commission exempts certain types of communication devices from the licensing requirements. One of these is the "handie-talkie" unit. In order to qualify the unit must: (1) limit the power output to 100 milliwatts or less, (2) be crystal-controlled; (3)

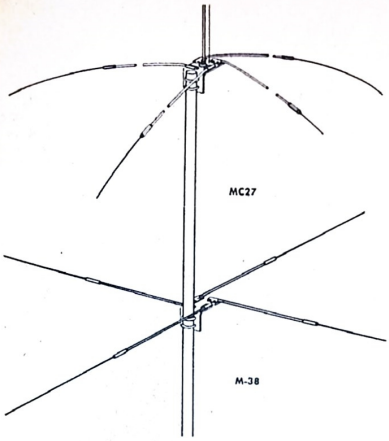




WONDERSHAFT Fiberglass Model 146 "Slim Jim" CB Antenna

WONDERSHAFT Fiberglass Model 176 Base Station Antenna

WONDERSHAFT Fiberglass Model 72-1 Marine Antenna, lever-lowered



Base-Station Antenna

have a single-element whip antenna whose length does not exceed 60 inches. The circuitry in these sets must also meet certain FCC requirements.

Communications with these sets are normally limited to other sets of the same type, but a transceiver operating license-free under Part 15 **can** under certain circumstances be used to communicate with a licensed 5-watt CB unit. If the 100 milliwatt set meets the specifications set down by the FCC for Part 95 operation it can be used in this way, but a call-sign must then exist between the two sets.

Call-ups

The method used in a CB call-up is fairly uniform throughout the country. The base station is usually considered **unit 1**, and the various mobile or other stationary stations operation under the same license are units 2, 3, 4 and so forth. A typical call-up might look like this:

Base Station: "KCB1234, KCB1234 Unit One to Unit Three. Over."

Outstation: "This is KCB1234 Unit Three. Over."

Base Station: "The parts we were waiting for have come in. Please return to the plant and pick them up now. Over."

Outstation: "Okay. I'll be through here in about ten minutes, and then head right back to the plant. Over."

Base Station: "Very good. KCB1234 Unit One off and clear with Unit Three."

Outstation: "KCB1234 Unit Three off and clear with Unit One."

Canadian Citizens Band

In 1962 the Canadian Department of Transport, which has functions that correspond to the Federal Communications Commission of the United States, organized the **General Radio Service.** Generally speaking, this service is the equivalent of the Citizens Radio Service in the U.S.

The regulations for the GRS are similar to those for CB across the border. Applicants for a station license must be British subjects or landed immigrants at least 18 years old or companies incorporated within the Commonwealth. They must be able to show a need for communication with similarly licensed Canadian stations.

Users of the GRS must restrict their transmissions to information

WONDERSHAFT Fiberglass Model 156 Mobile Antenna. Designed to look like a standard AM antenna, it can be used for both AM and CB

WONDERSHAFT Fiberglass Model 173 "VIP" Top-loading CB Antenna

concerning the business or personal affairs of the operator. The GRS is forbidden to communicate with radio stations in any other service.

The General Radio Service 11-meter band has 19 channels allocated for its use which, if numbered 1 through 19 would correspond directly with the Citizens Radio Service channels 4 through 22.

GRS users are not allowed to communicate with CB operators across the border. As a general rule United States CBers are not permitted to use their transceivers after they cross the Canadian border. This reciprocity, which is extended to ham radio operators, is, at the present time, denied to users of the Citizens Band.

The offices of the Department of Transport in Canada, which are listed in the section on amateur radio, will be able to supply anyone interested with further information on Canada's Citizens Band. The license fee for GRS stations is $3.00 per unit; a license is good for a three-year period.

CB Clubs

Citizens Band radio clubs have come into existence across the country. Beside providing their members with enjoyment and the mutual exchange of information, these organizations have proven their potential use in disaster and Civilian Defense activities. In case of flood, fire or other disaster, the CB clubs stand ready to provide useful communications.

If you are interested in obtaining more information about these clubs, or joining one, check with the list of clubs in this chapter for one near you. The members will be glad to provide you with whatever information you need.

CITIZENS BAND CLUBS

ALABAMA

The CEE Banders Radio Phone Club
P.O. Box 563
Birmingham, Alabama

Dixie 5-Watters CB Club
P.O. Box 211
Piedmont, Alabama

ARKANSAS

Central Arkansas Citizens Band Radio Club
Box 534
Little Rock, Arkansas

CALIFORNIA

5-Watt Wizards CB Radio Club of San Bernardino Valley
P.O. Box 3364
San Bernardino, California

Southern California 11-M CB Association
P.O. Box 17296
San Diego 17, California

Southern California 11-Meter League
1001 Hi Point Street
Los Angeles 35, California

COLORADO

Cherry Vale Tracking Team
620 Yale
Boulder, Colorado

Denver Radio Club, Inc.
1328 Holly Street
Denver, Colorado

CONNECTICUT

Norwalk CB Radio Association
Box 693
Norwalk, Connecticut

1 W Airline CB Club
53 Bretton Road
Middletown, Connecticut

Radio Rescue Service, Inc.
55 Bedford Avenue
E. Hartford 8, Connecticut

Shoreline Chapter 1 CB Association of Connecticut
Box 178, RFD #1
Essex, Connecticut

DELAWARE

Delaware Valley Citizens Band Association
P.O. Box 1986
Wilmington 99, Delaware

THE DISTRICT OF COLUMBIA

Suburban Citizens Radio Association of the Greater Metropolitan Area
Washington, D.C.

FLORIDA

Broward Citizens Radio Club
P.O. Box 8092
Fort Lauderdale, Florida

Florida REACT Headquarters
975 South Shore Drive
Miami Beach, Florida

Metropolitan Dade Citizens Radio Club, Inc.
1326 N.W. 102nd Street
Miami, Florida

South Florida REACT
P.O. Box 7285
Ludlim Branch
Miami, Florida

GEORGIA

Athens Contact Club of Athens, Georgia
215 Meadowview Road
Athens, Georgia

Dixie Communications Club
P.O. Box 136
Decatur, Georgia

The Rebel Communications Association
P.O. Box 6487
Marietta, Georgia

ILLINOIS

Carroll County Sheriff
CB Radio Patrol
Lanark, Illinois

Celestial Citizen Banders, Inc.
1604 Charlotte Street
Pekin, Illinois

CB Hi-Lighters, Inc.
121 Sherman Avenue
Aurora, Illinois

Citizens Band Radio Club
Box 178
Lombard, Illinois

Citizens Radio Association of Lake County
12 South Gretta
Waukegan, Illinois

Citizens Radio League of Chicago
4818 North Natchez Avenue
Chicago 31, Illinois

Corn Belt Citizen Banders
216 Robinhood Lane
Bloomington, Illinois

Fox River Radio League
925 Walter Avenue
Aurora, Illinois

Fox Valley Citizens Radio Sentinels
Elgin, Illinois

Illini Class "D" Radio Club
1520 Hedge Road
Champaign, Illinois

Illinois Valley Citizen Banders Club
P.O. Box 141
Peoria, Illinois

Little Egypt Citizen Band Radio Club
Box 43
Wayne City, Illinois

Midwest DX-SW Radio Club
2100 West William Street
Decatur, Illinois

Ottawa Five Watters
P.O. Box 84
Ottawa, Illinois

Static Pushers CB Radio Club
2923 21st Street
Rockford, Illinois

West Suburban Radio League
4109 West 26th Street
Chicago 23, Illinois

INDIANA

Central Indiana Citizens Band Club
P.O. Box 2155
Anderson, Indiana

Evansville Citizens Radio League
804 Seiler Avenue
Evansville, Indiana

Wabash Valley CB Club
420 Shelby Street
Vincennes, Indiana

Wabash Valley CRL, Inc.
P.O. Box 911
Terra Haute, Indiana

IOWA

Cedar Rapids Citizens Radio Club
Route 1
Cedar Rapids, Iowa

Des Moines Mobile Emergency Team
512 Forest Avenue
Des Moines, Iowa

Little Soo CB Club
221 North 11th Street
Cherokee, Iowa

Tri-State Fleawatters, Inc.
Box 1652
Sioux City 2, Iowa

KANSAS

C.R.E.S.T. CB Radio Club
P.O. Box 236
Manhattan, Kansas

KENTUCKY

Citizens Band Radio "Club 23"
131 North Birchwood Avenue
Louisville, Kentucky 40206

5 Watt Club
Glasgow, Kentucky

Kentuckiana CB Radio Club
3814 Dixie Highway
Louisville, Kentucky

Kentucky-Indiana CB Radio League
3814 Dixie Highway
Louisville, Kentucky

Ohio Valley CB Club
Sturgis, Kentucky

LOUISIANA

Cenia CB Radio Club
1156 Rapides Avenue
Alexandria, Louisiana 71303

Greater New Orleans CBR Association
4515 Calumet Street
Metairie. Louisiana

MARYLAND

4W 24 CB Club
3702 Allison Street
Brentwood, Maryland

The Holiday Citizen Banders of
Maryland, Inc.
5721 Moravia Road
Baltimore 6, Maryland

Queen City 5 Watters
711 North Mechanic Street
Cumberland, Maryland

MASSACHUSETTS

Cape Cod CB Radio Club
Box 131
Kingston, Massachusetts

Channel Jammers
47 Pine Street
Swampscott, Massachusetts

The 11/27 Radio Club
Millis, Massachusetts

The Five Watt Whips of Lowell, Mass.
Lowell, Massachusetts

Greater Boston 11 Meter Association
95 Langley Road
Newton Center, Massachusetts

Metropolitan Citizen Radio Association
496 Main Street
Hingham, Massachusetts

Plymouth County CB'ers, Inc.
71 Bates Street
North Abington, Massachusetts

MICHIGAN

Cereal City CRC
27 Richards Pl.
Battle Creek, Michigan

Citizens Radiophone Association
3306 Kanter
Detroit 11, Michigan

The Crystal Wizards Club
P.O. Box 304
Muskegon, Michigan

5 Watter CB Club, Inc.
Box 9223
Lansing 9, Michigan

Oakland Social C-Bee's, Inc.
2280 Maplecrest Drive
Pontiac, Michigan

Saginaw Valley CB Association
1417 Passolt Street
Saginaw, Michigan

Southeastern Michigan 11 Meter Radio Club
215½ North Gratiot
Mount Clements, Michigan

Suburban Mobile Radio Association
P.O. Box 2
Madison Heights, Michigan

MINNESOTA

Twin Ports Mobile Emergency Unit
230 North 18th Avenue West
Duluth 6, Minnesota

MISSISSIPPI

Jackson Citizens Band Radio Club
P.O. Box 10746 Westland Plaza
Jackson, Mississippi

Meridian Citizen Band Club
P.O. Box 1389
Meridian, Mississippi

MISSOURI

C.B.-Aires
722 Brookridge Road
Webster Groves 19, Missouri

CB Association of Greater Kansas City
Box 971
Kansas City 41, Missouri

M.O.K. Citizens Band Radio Club
1802 Murphy
Joplin, Missouri

North Area Emergency Radio Team
4507 North Charlotte
Kansas City, Missouri

MONTANA

Midland Empire CB Radio Club
210 South 34th Street
Billings, Montana

NEVADA

Silver State CB Association
1150 Vassar Street
Reno, Nevada

NEW HAMPSHIRE

CB Socialites
Main Street
Plaistow, New Hampshire

5 Watt Whips of Lowell
Anders Lane
Nashua, New Hampshire

Tri-County Emergency Communication Net., Inc.
Box 102
Dover, New Hampshire

NEW JERSEY

Bergen County Citizen Banders Chapter of MCEU
P.O. Box 83
Fair Lawn, New Jersey

Blair House Communications
1116 St. George Avenue
Avenel, New Jersey

Cape May County CB Club
Box 121
Wildwood, New Jersey

C.B. Knights
419 West Park Avenue
Oakhurst, New Jersey

Citizens Band Radio Relay League
1511 Rose Terrace
Union, New Jersey

Delaware Valley Citizens Radio League
P.O. Box 327
Haddonfield, New Jersey

Jersey 5 Watters
113 Dailey Avenue
Hillside, New Jersey

South Jersey Citizens Club
P.O. Box 99
Stratford, New Jersey

United CB'ers
79 Garden Street
Hoboken, New Jersey

NEW MEXICO

Albuquerque Citizens Radio Association
Box 354
Albuquerque, New Mexico

NEW YORK

Bronx-Westchester Citizens Band Association
1716 Pitman Avenue
Bronx 66, New York

The Capital District CB Radio Club
P.O. Box 1332
Albany, New York

The Capital District CB Radio Club
46 Continental Avenue
Cohoes, New York

Chili-Ogden-Riga-Klub
P.O. Box 227
North Chili, New York

Citizens Band Radio Relay League
86-51 Broadway
Elmhurst 73, L.I. New York

The Citizen Band Trimmers, Inc.
125 Cochran Place
Valley Stream L.I. New York

Club Rescue 14
1386 Luddington Road
East Meadow, New York

The Five-Watt Wizards
137-27A 68th Drive
Kew Garden Hills 67, New York

Kadets of America
83-34 265th Street
Floral Park, New York

M.C.E.U. CB Club
1203 Butternut Street
Syracuse 8, New York

Mid-Hudson CB Club
85 Mansion Street
Poughkeepsie, New York

Nassau CB Club
4115 Hempstead Turnpike
Bethpage L.I. New York

Niagara Frontier CB Club
209 Fletcher Street
Tonawanda, New York

Putnam County Communications Association
P.O. Box 219
Shrub Oak, New York

Southern Tier Citizen Band Radio Club
86 South Washington Street
Binghampton, New York

Sullivan Trail CB
961 Charles Street
Elmira, New York

Troy Area CB Radio Club
Lansing Station Box 299
Troy, New York 12182

NORTH CAROLINA

Carolina Citizens Band Federation
P.O. Box 778
Elizabethtown, North Carolina

Confederate CB Corps
Shelby, North Carolina

Durham CB Radio Club
Box 8124 North Durham Station
Durham, North Carolina

Fifth District CB Radio Association, Inc.
12 Park Avenue
Concord, North Carolina

Greensboro CB Service Unit
500 Battleground Avenue
Greensboro, North Carolina

North Carolina CB Radio Association
P.O. Box 835
Kinston, North Carolina

10/100 Volunteers CB Radio Club of Cool Springs Volunteer Fire Department

Route 1
Statesville, North Carolina

OHIO

Central Ohio CB Association
P.O. Box 92
Columbus 16, Ohio

Citizens Radio Service Club
224 South Fayette Street
Washington C.H., Ohio

11 O-M Club
Box 111
Toledo 1, Ohio

Findlay CB Radio Club
P.O. Box 123
Findlay, Ohio

Firelands CB Emergency Net
Huron County Sheriff's Department
Norwalk, Ohio

5 Watters of Lake County
706 Lucille Avenue
Painesville, Ohio

Greater Cincinnati Amateur Radio Association, Inc.
4440 Poole Road
Cincinnati 36, Ohio

Hall of Fame CB Radio Club
4411 Starkey Street
East Canton, Ohio
Monitors Social Club
8200 Berman Avenue
Cleveland 5, Ohio

Northern Hills Citizens Radio Club
2612 Honeyhill Court
Cincinnati 36, Ohio

The O-K Citizens Band Radio Club
125 Chapel Road
Amelia 2, Ohio

Penova CB Radio Club
Route 1 Cannons Mills Road
East Liverpool, Ohio

South-Lynd Radio Club
1276 Roselawn Road
Lyndhurst 24, Ohio

Southwestern Ohio CB Association
P.O. Box 231
Mason, Ohio

Ten-Twenty-Three CB Radio Club
Marion, Ohio

Tri-State 11 Meter Club
508 Union Avenue
Steubenville, Ohio

27 Meggers CB Club
1553 Algiers Drive
Mayfield Heights 24, Ohio

27 Meggers CB Club
1814 Beaconwood
South Euclid 21, Ohio

Y City CB Radio Association
Zanesville, Ohio

OKLAHOMA

Mid-State Minutemen CB Radio Club of Oklahoma, Inc.
P.O. Box 783
Stillwater, Oklahoma

OREGON

Blue Mountain 10-20's
318 N.W. 6th
Pendleton, Oregon

Oregon CB Association
P.O. Box 5133
Portland, Oregon

Oregon Grapevine, Inc.
Box 4261
Portland 8, Oregon

PENNSYLVANIA

Allegheny Kiski 5 Watters
1141 Sixth Avenue
New Kensington, Pennsylvania

Allegheny Valley CB Club
Box 7819
Pittsburgh, Pennsylvania

Buxmont Citizens Radio League
49 Ridge Avenue
Sellersville, Pennsylvania

Cambria County Citizens Communication Club
324 Boise Street
Johnstown, Pennsylvania

CB Rangers
Box 284
Butler, Pennsylvania

Citizens Radio Association of Crawford County
1012 Water Street
Meadville, Pennsylvania

Delaware County Citizens Radio League
Box 523
Havertown, Pennsylvania

Delaware Valley CB Association
12 Parkside Circle
Levittown, Pennsylvania

5-11 Radio Club
868 Glass Run Road
Pittsburgh, Pennsylvania

Johnstown CB's
Box 852
Johnstown, Pennsylvania

Keystone 11 Meter League
P.O. Box 45
Pottstown, Pennsylvania

Lycoming CB Radio Club
Box 247
Montoursville, Pennsylvania

Mason-Dixon CB Radio Club
R.D. 2
Greencastle, Pennsylvania

Montgomery County Jr. CD Organization
9 South Chestnut
Ambler, Pennsylvania

Punxsutawney CB Club
111 Lane Avenue Box 32
Punxsutawney, Pennsylvania

Qui-Co Citizens Radio League
112 North 9th Street
Reading, Pennsylvania

Sociable 5 Watts Club
c/o Roy Shetler
Enon Valley, Pennsylvania

South-Eastern Pennsylvania Citizens Radio Club
241 Hayes Street
Chester, Pennsylvania

Susque CB Radio Club
P.O. Box 644
Williamsport, Pennsylvania

The Teen Keystone Radio League
7807 Thouron Avenue
Philadelphia, Pennsylvania 19150

Tri County Citizens Radio Association
824 Regina Street
Philadelphia, Pennsylvania 19116

Tri-County Citizens Radio Association
P.O. Box 53
Southhampton, Pennsylvania

Western Area Citizens Band Club
VA Hospital, Box 62
Butler, Pennsylvania

The Zelienople Tri-County REACT
Zelienople, Pennsylvania

RHODE ISLAND

Bristol County CB Radio Club of Rhode Island
324 State Street
Bristol, Rhode Island

TENNESSEE

CBers of Lower East Tennessee
520 1st Street
Athens, Tennessee

Johnson City CB Club
Box 3191 Carroll Reece Barnhouse
Johnson City, Tennessee

Memphis Megamites
4727 Poplar, Suite 201-202
Memphis, Tennessee

TEXAS

Beaumont CB Radio Club
P.O. Box 6244
Beaumont, Texas 77705

Caddo District CB Club
P.O. Box 792
Marshall, Texas

CB Radio Club of Fort Worth
Box 9697
Fort Worth 7, Texas

Emergency Communications Organization
1623 West 7th
Texarkana, Texas

Galveston County CB Radio
1015½ 45th Street
Galveston, Texas

Greater Dallas CB Club
P.O. Box 6023 Terminal Annex
Dallas, Texas 75201

Greater Dallas CB Radio Club
1318 Michigan Avenue
Dallas, Texas 75216

Heart of Texas CB Club
3816 Parrott
Waco, Texas

White Rock Two Way Radio Club
9929 Bethany Drive
Dallas, Texas

VERMONT

CB Radio Patrol Headquarters
344 North Winooski Avenue
Burlington, Vermont 05401

Otter Valley Citizens Radio Club
299 West Street
Rutland, Vermont

VIRGINIA

Arfax Citizens Band Club
P.O. Box 551
Falls Church, Virginia

CB 5 Watters of Virginia
232 Powhatten Parkway
Hampton, Virginia

"5" Watters of Virginia
P.O. Box 361
Newport News, Virginia
Virginia Beach CB Club
P.O. Box 225
Virginia Beach, Virginia

Virginia Citizens Radio Association
Box 471
Annandale, Virginia

WASHINGTON

Evergreen Area CB Association
9220 Holly Drive
Everett, Washington

14 W Association of Seattle
15816 28th Avenue N.E.
Seattle 15, Washington

Tacoma CB Radio Association
2929 Millon Avenue
Tacoma, Washington

WSCBA
7519 Empire Way South
Seattle 18, Washington

WEST VIRGINIA

Fort Henry CB Club
2144 Market Street
Wheeling, West Virginia

Kanawha Valley Communication Club
Rt. 2, Box 255
St. Albans, West Virginia

Tri-County Citizens Banders
P.O. Box 4061
Parkersburg, West Virginia

Tri-County Citizens "D" Banders
428 Fairview Street
Mannington, West Virginia

WISCONSIN

Manitowoc County Communicators
1511 Kuhl Street
Manitowoc, Wisconsin

Milwaukee CB Club, Inc.
2747 North 52nd Street
Milwaukee 10, Wisconsin

Racine CB Club
1832 Ridge Drive
Racine, Wisconsin

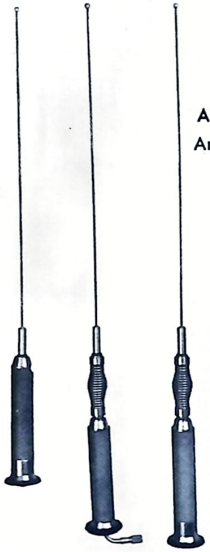
Waukesha County CB Club, Inc.
463 West Wisconsin Avenue
Oconomowoc, Wisconsin

CANADA

Chateauguay General Radio Club
1 St. Francis Boulevard
Chateauguay, P.Q., Canada

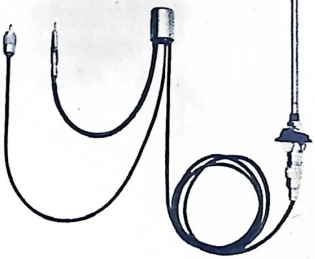
Newfoundland CB Club
Suite 24 Box 6
St. John's, Newfoundland, Canada

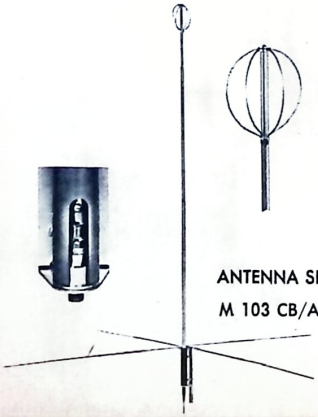
ANTENNA SPECIALISTS CO.
18-foot Vertical Coaxial Antenna



ANTENNA SPECIALISTS CO.
Antennas for car rooftop mounting

ANTENNA SPECIALISTS CO.
M67 Base-Loaded CB Mobile Antenna





ANTENNA SPECIALISTS CO.
M 103 CB/AM Combination for car mount

YOUR CITIZENS RADIO LICENSE

FEDERAL COMMUNICATIONS COMMISSION

Part 19—Citizens Radio Service

(September 1958 Edition)

TITLE 47 — TELECOMMUNICATION
Chapter 1 — Federal Communications Commission

PART 19—CITIZENS RADIO SERVICE

The Commission, by its Second Report and Order, FCC 58-798 adopted July 31, 1958, in Docket 11994, revised Part 19 of its rules and regulations, effective September 11, 1958, to read as set forth below.

FEDERAL COMMUNICATIONS COMMISSION,
[SEAL] GORDON J. KENT,
Acting Secretary.

Subpart A — General

Sec.

Subpart B — Applications and Licenses

Subpart C — Technical Regulations

Subpart D — Station Operating Requirements

AUTHORITY: §§ 19.1 to 19.107 issued under sec. 4, 48 Stat. 1066, as amended; 47 U. S. C. 154. Interpret or apply sec. 303, 48 Stat. 1082, as amended; 47 U.S.C. 303.

SUBPART A — GENERAL

§ 19.1. *Basis and purpose.* The rules and regulations set forth in this part are issued pursuant to the provisions of Title III of the Communications Act of 1934, as amended, which vests authority in the Federal Communications Commission to regulate radio transmissions and to issue licenses for radio stations. The rules in this part are designed to provide for private short-distance radiocommunications, radio signalling, and the control of remote objects or devices by means of radio, and to provide procedures whereby manufacturers of radio equipment to be used or operated in the Citizens Radio Service may obtain type acceptance and/or type approval of such equipment as may be appropriate.

§ 19.2. *Definitions.* For the purpose of this part, the following definitions shall be applicable. For other definitions, refer to Part 2 of this chapter.

(a) Definitions of services.

Citizens Radio Service. A radio communications service of fixed, land, and mobile stations intended for personal or business radiocommunication, radio signalling, control of remote objects or devices by means of radio, and other purposes not specifically prohibited in this part.

Fixed service. A service of radiocommunication between specified fixed points.

Mobile service. A service of radiocommunication between mobile and land stations or between mobile stations.

(b) Definitions of stations.

Base station. A land station in the land mobile service carrying on a service with land mobile stations.

Class A citizens radio station. A station in the Citizens Radio Service operating on an assigned frequency available to that service in the 460-470 Mc frequency band, with an authorized plate input power of 60 watts or less. (Class A stations are authorized to be operated as mobile stations, as base stations, or as fixed stations.)

Class B citizens radio station. A mobile station in the Citizens Radio Service operating on an authorized frequency available to that service in the 460-470 Mc frequency band with an authorized plate input power of 5 watts or less. (Class B stations are authorized to be operated as mobile stations only; however, they may be operated at fixed locations in accordance with other provisions of this part.)

Class C citizens radio station. A mobile station in the Citizens Radio Service operating on an authorized frequency in the 26.96-27.23 Mc frequency band, or on the frequency 27.255 Mc, for the remote control of objects or devices by radio, or for the remote actuation of devices which are used solely as a means of attracting attention. (Class C stations are authorized to operate as mobile stations only; however, they may be operated at fixed locations in accordance with other provisions of this part.)

Class D citizens radio station. A mobile station in the Citizens Radio Service operating on an authorized frequency in the 26.96-27.23 Mc frequency band with an authorized plate input power of 5 watts or less for radiotelephony only. (Class D stations are authorized to operate as mobile stations only; however, they may be operated at fixed locations in accordance with other provisions of this part.)

Fixed station. A station in the fixed service.

Land station. A station in the mobile service not intended for operation while in motion. (Of the various types of land stations, only the base station is pertinent to this part.)

Mobile station. A station in the mobile service intended to be used while in motion or during halts at unspecified points. (For the purposes of this part, the term includes hand-carried and pack-carried units.)

(c) Miscellaneous definitions.

Antenna structure. The term "antenna structure" includes the radiating system, its supporting structures, and any surmounting appurtenances.

Assigned frequency. The frequency appearing on a station authorization, from which the carrier frequency may deviate by an amount not to exceed that permitted by the frequency tolerance.

Authorized bandwidth. The maximum width of the band of frequencies, as specified in the authorization, to be occupied by an emission.

Bandwidth occupied by an emission. The band of frequencies comprising 99 percent of the total radiated power extended to include any discrete frequency on which the power is at least 0.25% of the total radiated power.

Harmful interference. Any radiation or any induction which endangers the functioning of a radionavigation service or of a safety service, or obstructs or repeatedly interrupts a radio service operating in accordance with applicable laws, treaties, and regulations.

Landing area. A landing area means any locality, either of land or water, including airports and intermediate landing fields, which is used or approved for use for the landing and take-off of aircraft, whether or not facilities are provided for the shelter, servicing, or repair of aircraft, or for receiving or discharging passengers or cargo.

Remote control. The term "remote control" when applied to the use or operation of a citizens radio station means control of the transmitting equipment of that station from any place other than the location of the transmitting equipment except that direct mechanical control or direct electrical control by wired connections of transmitting equipment from some other point on the same premises, craft or vehicle shall not be considered to be remote control. (Authorization for the use or operation of any transmitting equipment by remote control in the Citizens Radio Service is granted only in the case of Class A base or fixed stations.)

Station authorization. Any construction permit, license, or special temporary authorization issued by the Commission.

§ 19.3. *Policy governing the assignment of frequencies.* (a) The frequencies which may be assigned to Class A stations in the Citizens Radio Service, and the frequencies which are available for use by Class B, C, or D stations, are listed in Subpart C. All applicants for, and licensees of, stations in this service shall cooperate in the selection and use of the frequencies assigned or authorized, in order to minimize interference and thereby obtain the most effective use of the authorized facilities. Each frequency available for assignment to, or use by, stations in this service is available on a shared basis only and will not be assigned for the exclusive use of any one applicant; such use may also be restricted to one or more specified geographical areas.

(b) In no case will more than one frequency be assigned to Class A stations for the use of a single applicant in any given area until it has been demonstrated conclusively to the Com-

mission that the assignment of an additional frequency is essential to the operation proposed.

§ 19.4. *General citizenship restrictions.* A station license may not be granted to or held by:

(a) Any alien or the representative of any alien;

(b) Any foreign government or the representative thereof;

(c) Any corporation organized under the laws of any foreign government;

(d) Any corporation of which any officer or director is an alien;

(e) Any corporation of which more than one-fifth of the capital stock is owned of record or voted by: Aliens or their representatives; a foreign government or representative thereof; or any corporation organized under the laws of a foreign country;

(f) Any corporation directly or indirectly controlled by any other corporation of which any officer or more than one-fourth of the directors are aliens, if the Commission finds that the public interest will be served by the refusal or revocation of such license; or

(g) Any corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by: Aliens or their representatives; a foreign government or representatives thereof; or any corporation organized under the laws of a foreign government, if the Commission finds that the public interest will be served by the refusal or revocation of such license.

SUBPART B — APPLICATIONS AND LICENSES

§ 19.11. *Station authorization required.* No radio station shall be operated in the Citizens Radio Service except under and in accordance with an authorization granted by the Federal Communications Commission.

§ 19.12. *Eligibility for station license.* Subject to the general restrictions of § 19.4, any person is eligible to hold authorizations to operate stations in the Citizens Radio Service: *Provided,* That if the applicant for a Class A, Class B, or Class D station authorization is an individual or partnership, such individual or each partner is eighteen or more years of age; or if the applicant for a Class C. station authorization is an individual or partnership, such individual or each partner is twelve or more years of age: *And provided further,* That not more than one person shall be eligible as licensee of the same transmitting equipment.

NOTE: While the basis of eligibility in this service includes any state, territorial or local governmental entity or any organization or association operating by the authority of such governmental entity, including any duly authorized state, territorial or local civil defense organization, it should be noted that the frequencies available to stations in this service are shared without distinction between all licensees and that during periods of normal operation no protection can be afforded to the communications of any station in this service, even when involving the protection of life or property, from interference which may be caused by the operation of other authorized stations.

§ 19.13. *Filing of applications.* (a) To assure that necessary information is supplied in a consistent manner by all persons, standard forms are prescribed for use in connection with the majority of applications and reports submitted for Commission consideration. Standard numbered forms applicable to the Citizens Radio Service are discussed in § 19.15 and may be obtained from the Washington 25, D.C., office of the Commission, or from any of its engineering field offices.

(b) An application for any class citizens radio station authorization and all correspondence relating thereto shall be submitted to the Commission's office at Washington 25, D.C., and should be directed to the attention of the Secretary. Applications involving Class C or Class D station equipment which is neither type approved nor crystal controlled, whether of commercial or home construction, shall be accompanied by supplemental data describing in detail the design and construction of the transmitter and the methods employed in testing it to determine compliance with the technical requirements set forth elsewhere in this part.

(c) Unless otherwise specified, an application shall be filed at least sixty days prior to the date on which it is desired that Commission action thereon be completed. In any case where the applicant has made timely and sufficient application for renewal of license, in accordance with the Commission's rules, no license with reference to any activity of a continuing nature shall expire until such application shall have been finally determined.

(d) Failure on the part of the applicant to provide all the information required by the application form, or to supply the necessary exhibits or supplementary statements may constitute a defect in the application.

§ 19.14. *Who may sign applications.* The application for an authorization shall be signed under oath or affirmation by the applicant if the applicant be an individual, by any one of the partners if an applicant be a partnership, by an officer if the applicant be a corporation, or by a member who is an officer if the applicant be an unincorporated association: *Provided, however,* That applications may be signed by the attorney for an applicant in case of physical disability of the applicant or his absence from the continental United States. If it be made by a person other than the appli-

cant, he must set forth in the verification the grounds of his belief as to all matters not stated upon his knowledge and the reason why it is not made by the applicant.

§ 19.15. *Standard forms to be used*—(a) *FCC Form 505, Application for Citizens Radio License.* This form shall be used when:

(1) Application is made for a new Class A base station or fixed station authorization. Separate applications shall be submitted for each proposed base or fixed station at different fixed locations; however, all equipment intended to be operated at a single fixed location is considered to be one station which may, if necessary, be classed as both a base station and a fixed station.

(2) Application is made for a new Class A, Class B, Class C, or Class D station authorization for any required number of mobile units (including hand-carried and pack-carried units) to be operated as a group in a single radiocommunication system. Separate application shall be submitted for each proposed Class A, Class B, Class C, or Class D mobile station; however, an application for Class A authorization for mobile units may be combined with the application for a single Class A base station authorization when such mobile units are to be operated with that base station only.

(3) Application is made for station license of any Class A base station or fixed station upon completion of construction or installation in accordance with the terms and conditions set forth in any construction permit required to be issued for that station.

(4) Application is made for modification of any existing Class A, Class B, Class C, or Class D station authorization in those cases where prior Commission approval of certain changes is necessary (see § 19.24).

(5) Application is made for renewal of an existing station authorization, or for reinstatement of an expired authorization.

(b) *FCC Form 401A, Description of Proposed Antenna Structure.* This form shall be submitted in triplicate when specifically requested by the Commission in a particular case. Situations in which FCC Form 401-A may be required include, but are not necessarily limited to, the following:

(1) Where the antenna structure proposed to be erected will exceed an overall height of 170 feet above ground level, or

(2) Where the antenna structure proposed to be erected will exceed an overall height of one foot above the established airport (landing area) elevation for each 200 feet of distance or fraction thereof from the nearest boundary of any such landing area.

§ 19.16. *Amendment or dismissal of application.* (a) Any application may be amended upon request of the applicant as a matter of right prior to the time the application is granted or designated for hearing. Each amendment to an application shall be signed, subscribed and submitted in the same manner and with the same number of copies as required for the original application.

(b) Any application may, upon written request signed by the applicant or his attorney, be dismissed without prejudice as a matter of right prior to the time the application is granted or designated for hearing.

§ 19.17. *Transfer of license prohibited.* A station authorization in the Citizens Radio Service may not be transferred or assigned. In lieu of such transfer or assignment, an application for new station authorization shall be filed in each case, and the previous authorization shall be forwarded to the Commission for cancellation.

§ 19.21. *Defective applications.* (a) If an applicant is requested by the Commission to file any documents or information not included in the prescribed application form, a failure to comply with such request will constitute a defect in the application.

(b) When an application is considered to be incomplete or defective, such application will be returned to the applicant, unless the Commission may otherwise direct. The reason for return of the applications will be indicated, and if appropriate, necessary additions or corrections will be suggested.

§ 19.22. *Partial grant.* Where the Commission, without a hearing, grants an application in part, or with any privileges, terms, or conditions other than those requested, the action of the Commission shall be considered as a grant of such application unless the applicant shall, within 30 days from the date on which such grant is made, or from its effective date if a later date is specified, file with the Commission a written request, rejecting the grant as made. Upon receipt of such request, the Commission will vacate its original action upon the application and, if necessary, set the application for hearing.

§ 19.23. *License period.* Unless otherwise stated in the authorization, licenses for all stations in the Citizens Radio Service will normally be issued for a term of five years from the date of original issuance, renewal, or modification.

§ 19.24. *Changes in authorized stations.* Authority for certain changes in authorized stations must be obtained from the Commission before the changes are made, while other changes do not require prior Commission approval. The following paragraphs describe the conditions under which prior Commission approval is or is not necessary.

(a) Proposed changes which will result in operation inconsistent with any of the terms of the current authorization require that an application for modification of license be submitted

to the Commission. Application for modification shall be submitted in the same manner as an application for a new station on FCC Form 505, and the licensee shall forward his existing authorization to the Commission for cancellation immediately upon receipt of the superseding authorization. Any of the following changes to the authorized stations may be made only upon approval by the Commission:

(1) Change the permanent address of the station licensee.

(2) Change the presently authorized location of a fixed transmitter or control point.

(3) Move, change the height of, or erect an antenna structure of the type which requires prior approval from the Commission as set forth in § 19.25 of this part.

(4) Increase the overall number of transmitters authorized.

(5) Make changes of any nature which may affect the operational characteristics of the transmitting equipment.

(6) Addition or deletion of control point(s) for presently authorized transmitter.

(7) Change or increase in the area of operation of a Class A station.

(8) Change the operating frequency of a Class A station.

(b) Proposed changes which will not depart from any of the terms of the outstanding authorization for the station involved may be made without prior Commission approval. Included in such changes is the substitution of various makes of transmitting equipment at any station provided that the particular equipment to be installed as included in the Commission's "Radio Equipment List, Part C," or, in the case of a Class C or Class D station using crystal control, the substitute equipment is crystal controlled; and provided the substitute equipment employs the same type of emission and does not exceed the frequency tolerance and power limitations prescribed for the particular class of station involved.

§ 19.25. *Limitation on antenna structures.* (a) No new antenna or antenna structures shall be erected for use by any station licensed or proposed to be licensed in this service, and no change shall be made in any existing antenna or antenna structures for use or intended to be used by any station licensed or proposed to be licensed in this service so as to increase its overall height above ground level, without prior approval from the Commission in any case when either:

(1) The antenna structures proposed to be erected will exceed an overall height of 170 feet above ground level, except where the antenna is mounted on top of an existing man-made structure, other than an antenna structure, and does not increase the overall height of such man-made structure by more than 20 feet; or

(2) The antenna structures proposed to be erected will exceed an overall height of one foot above the established airport (landing area) elevation for each 200 feet of distance or fraction thereof from the nearest boundary of such landing area, except where the antenna does not exceed 20 feet above the ground or where the antenna is mounted on top of an existing man-made structure, other than an antenna structure, or natural formation and does not increase the overall height of such man-made structure or natural formation by more than 20 feet. Application for Commission approval, if required, shall be submitted on FCC Form 505, unless specifically requested by the Commission to be filed on FCC Form 401-A.

(b) In cases where an FCC Form 401-A is required to be filed, further details as to whether an aeronautical study and/or obstruction marking may be required, as well as specifications for obstruction when required, may be obtained from Part 17 of this chapter.

(c) An antenna at a fixed location to be used by a Class B, Class C, or Class D mobile station shall not exceed 20 feet in height above any man-made structure or natural formation on which it is mounted, except that when mounted on an existing antenna structure of another station the antenna shall not exceed the height of that antenna structure.

SUBPART C—TECHNICAL REGULATIONS

§ 19.31. *Frequencies available.* (a) The following frequencies are available for assignment to Class A base, mobile, or fixed stations, on a shared basis with other stations in the Citizens Radio Service:

Mc	Mc	Mc	Mc
462.55	463.15	465.30	465.90
462.60	463.20	465.35	465.95
462.65	464.75	465.40	466.00
462.70	464.80	465.45	466.05
462.75	464.85	465.50	466.10
462.80	464.90	465.55	466.15
462.85	464.95	465.60	466.20
462.90	465.05	465.65	466.25
462.95	465.10	465.70	466.30
463.00	465.15	465.75	466.35
463.05	465.20	465.80	466.40
463.10	465.25	465.85	466.45

(b) The frequency 465.00 Mc as available for use by Class B mobile stations under the conditions specified in §§ 19.33 to 19.35 on a shared basis with other stations in the Citizens Radio Service. In addition, a Class B mobile station employing equipment which has been type accepted for use by Class A citizens radio stations, is authorized to be operated on any of the frequencies listed in paragraph (a) of this section.

(c) The following frequencies are available for use by Class C mobile stations when employing amplitude tone modulation or on-off keying of the unmodulated carrier for the remote control of objects or devices by radio, or

for the remote actuation of devices which are used solely as a means of attracting attention, on a shared basis with other stations in the Citizens Radio Service, subject to no protection from interference due to the operation of industrial, scientific, or medical devices on the frequency 27.12 Mc.

Mc	Mc	Mc
26.995	27.095	27.195
27.045	27.145	[1]27.255

[1]The frequency 27.255 Mc is shared with stations in other services.

(d) The following frequencies are available for use by Class D mobile stations employing radiotelephony only, on a shared basis with other stations in the Citizens Radio Service, and subject to no protection from interference due to the operation of industrial, scientific, or medical devices on the frequency 27.12 Mc.

Mc	Mc	Mc	Mc
26.965	27.035	27.115	27.185
26.975	27.055	27.125	27.205
26.985	27.065	27.135	27.215
27.005	27.075	27.155	27.225
27.015	27.085	27.165	
27.025	27.105	27.175	

(e) Subject to the proceeding in Docket No. 11959, the following frequencies are available for assignment to Class A fixed, base, or mobile stations, on a shared basis with other stations in the Citizens Radio Service:

Mc	Mc	Mc	Mc
460.05	460.30	460.55	460.80
460.10	460.35	460.60	460.85
460.15	460.40	460.65	460.90
460.20	460.45	460.70	460.95
460.25	460.50	460.75	

(f) Upon specific request accompanying application for renewal of station authorization, a Class A citizens radio station which prior to August 1, 1958 operated on a frequency in the 460-470 Mc band other than one specified in the preceding paragraphs of this section, may be assigned that frequency for continued use until not later than June 15, 1963, subject to all other provisions of this part.

§ 19.32. *Station power.* The maximum plate power input to the anode (plate) circuit of the electron tube or tubes which supply energy to the radiating system of a station in this service shall not exceed the following values:

Class of station	*Maximum plate power input*
Class A	60 watts
Class B	5 watts
Class C	5 watts[1]
Class D	5 watts

[1]A maximum plate power input of 30 watts

§ 19.33. *Frequency. tolerance.* The carrier is permitted on the frequency 27.255 Mc only. frequency of a station in this service shall be maintained within the following percentage of the authorized frequency:

Class of station	Maximum authorized plate power input	Frequency tolerance: Fixed and base	Frequency tolerance: Mobile
		Percent	*Percent*
A	3 watts or less	.001	.005
A	over 3 watts	.001	.001
B	3 watts or less		.5
B	over 3 watts		.3
C	5 watts or less[1]		.005
C	over 5 watts (27.255 Mc only)		.005
D	5 watts or less		.005

[1]Class C stations of 3 watts or less plate power input which are used solely for the remote control of objects or devices by radio (other than devices used solely as a means of attracting attention) are permitted a frequency tolerance of .01%.

§ 19.34. *Types of emission.* (a) Except as provided in paragraph (e) of this section, Class A stations in this service will normally be authorized to transmit radiotelephony only. The authorization to use radiotelephony will be construed to include the use of tone signals or signalling devices whose sole function is to establish and maintain voice communication between stations.

(b) Class B citizens radio stations are authorized to use amplitude or frequency modulation, or on-off unmodulated carrier, and may be used for radiotelephony to control remote objects or devices by means of radio, or to remotely actuate devices which are used as a means of attracting attention.

(c) Class C citizens radio stations are authorized to use amplitude tone modulation or on-off unmodulated carrier only, for the remote control of objects or devices by radio or for the remote actuation of devices which are used solely as a means of attracting attention. The authorization of a Class C station shall not be construed to include authority for the transmission of any form of intelligence.

(d) Class D citizens radio stations are authorized to use amplitude voice modulation for radiotelephone communications only. The authorization of Type A3 emission to a Class D station shall not be construed to include authority for the transmission of any form of radiotelegraphy; however, it will be construed to include the use of tone signals or signalling devices whose sole function is to establish and maintain voice communication between stations.

(e) Other types of emission not described

in paragraph (a) of this section may be authorized for Class A citizens radio stations upon a showing of need therefor. An application requesting such authorization shall fully describe the emission desired, shall indicate the band-width required for satisfactory communication, and shall state the purpose for which such emission is required. For information regarding the classification of emissions and the calculation of bandwidth, reference should be made to Part 2 of this chapter.

§ 19.35. *Emission limitations.* (a) Each authorization issued to a Class A citizens radio station will show, as a prefix to the classification of the authorized emission, a figure specifying the maximum bandwidth to be occupied by the emission.

(b) All operation of a Class B citizens radio station (including tolerance and bandwidth occupied by the emission) shall be confined to the frequency band 462.525-467.475 Mc.

(c) Except in the case of Class B citizens radio stations operating only on the frequency 465.00 Mc (see § 19.31 (b)), the maximum authorized bandwidth of the emission of any station employing amplitude modulation (Type A2 or A3 emission) shall be 8 kilocycles, and the maximum authorized bandwidth of the emission of any station employing frequency or phase modulation (Type F2 or F3 emission) shall be 40 kilocycles. The use of Type F2 or F3 emission in the frequency band 26.96-27.28 Mc is not authorized.

(d) For the purpose of demonstrating compliance with paragraphs (a), (b) and (c) of this section, the following limits apply:

(1) Any emission appearing on any frequency removed from the carrier frequency by at least 50 percent, but not more than 100 percent, of the maximum authorized bandwidth shall be attenuated not less than 25 db below the unmodulated carrier.

(2) Any harmonic or other spurious emission appearing on any frequency removed from the carrier frequency by at least 100 percent of the maximum authorized bandwidth shall be attenuated below the unmodulated carrier by not less than the amount indicated in the following table:

Maximum authorized plate power input to the final radio frequency stage:	*Attenuation (db)*
Over 3 watts	50
3 watts or less	[1]40

[1]In the case of Class B stations having a maximum plate power input to the final radio frequency stage of 3 watts or less, any emission appearing on any frequency that falls within a band allocated to industrial, scientific, and medical equipment under the provisions of Part 2 of this chapter shall be attenuated below the unmodulated carrier by not less than 30 db.

(e) When an unauthorized emission results in harmful interference, the Commission may, in its discretion, require appropriate technical changes in equipment to alleviate the interference.

§ 19.36. *Modulation limitations.* (a) When the radio frequency carrier of a station in this service is amplitude modulated, such modulation shall not exceed 100 percent on positive or negative peaks.

(b) Except in the case of Class B citizens radio stations operating only on the frequency 465.00 Mc (see § 19.31 (b)), the frequency deviation of any frequency modulated transmitter operated in this service shall not exceed ±15 kc and the simultaneous amplitude modulation and frequency or phase modulation of a transmitter is not authorized.

§ 19.41. *Technical measurements.* Where it appears that a station in this service is not being operated in accordance with the technical standards therefor, the Commission may require the licensee to provide for such tests as may be necessary to determine whether the equipment is capable of meeting these standards.

§ 19.42. *Acceptability of transmitters for licensing.* (a) From time to time the Commission will publish a list of equipment entitled "Radio Equipment List, Part C." Copies of this list are available for inspection at the Commission's offices in Washington, D.C., and at each of its field offices. Equipment once placed on that list will continue to be included on the list until it is removed therefrom by Commission action in accordance with the provisions of Part 2 of this chapter.

(b) Except for crystal-controlled transmitters used at Class C and Class D stations, each transmitter utilized by a station authorized for operation under this part must be a type which is included on the Commission's current "Radio Equipment List, Part C" and designated for use in this service. Until June 15, 1963, however, equipment on that list on September 11, 1958, may continue to be used, provided the operation of such equipment does not result in harmful interference due to the failure of that equipment to comply with the current technical standards of this part.

§ 19.43. *Type-acceptance of equipment.* (a) Any manufacturer of a transmitter to be built for use at Class A stations in this service, or any manufacturer of a crystal-controlled transmitter to be built for use at a Class C or Class D station in this service, may request "type-acceptance" for such transmitter following the type-acceptance procedures set forth in Part 2 of this chapter.

(b) Type acceptance for an individual transmitter may also be requested by an applicant for a station authorization by following the type

acceptance procedures set forth in Part 2 of this chapter. Such transmitters, if accepted, will not normally be included on the Commission's "Radio Equipment List, Part C," but will be individually enumerated on the station authorization.

(c) Additional rules with respect to type acceptance are set forth in Part 2 of this chapter. These rules include information with respect to withdrawal of type acceptance, modification of type-accepted equipment, and limitations on the findings upon which type acceptance is based.

§ 19.44. *Submission of Class B and non-crystal controlled Class C or Class D station equipment for type approval.* (a) Manufacturers of equipment capable of being used or operated in this service may submit units of such equipment to the Commission for type approval, upon grant of request therefor made in writing by the manufacturer to the Secretary of the Commission. Such a request normally will not be granted unless at least 100 units of the model to be submitted are scheduled for manufacture. When advised by the Commission, the applicant must send a typical production model or prototype of the particular equipment complete with tubes and power supply to the Commission's laboratory at Laurel, Maryland, for tests. All instructions which are intended to be supplied to the purchaser of the equipment shall be included. Transportation of the equipment and associated documents to and from the laboratory shall be at no cost to the Government.

(b) Prior to approval or rejection of the equipment, the results of these tests will be made known only to the responsible Government officials and to the Commission. An official report of the tests will be made available only to the manufacturer involved; however, the Commission will publish from time to time lists of approved equipment.

(c) The prescribed tests may be conducted by the Federal Communications Commission or by any other cooperating Government department. In addition, field tests, as deemed necessary or desirable by the Commission, may be carried out by authorized Government personnel to determine the reliability of the equipment under operating conditions comparable to those expected to be encountered in actual service.

(d) Type approval is not required for Class C or Class D station equipment employing crystal control; however, the licensee may be required to certify that the frequency stability of the crystal-controlled transmitter is within the tolerance specified elsewhere in this part.

§ 19.45. *Type approval of receiver-transmitter combinations.* Type approval will not be issued for transmitting equipment for operation under this part when such equipment is enclosed in the same cabinet, is constructed on the same chassis in whole or in part, or is identified with a common type or model number with a radio receiver, unless such receiver has been certificated to the Commission as complying with the requirements of Part 15 of this chapter.

§ 19.51. *Minimum equipment specifications.* Equipment submitted for type approval in this service shall be capable of meeting the technical specifications contained in this part for Class B, Class C, or Class D stations, and, in addition, shall comply with the following:

(a) Any basic instructions concerning the proper adjustment, use, or operation of the equipment that may be necessary shall be attached to the equipment in a suitable manner and in such positions as to be easily read by the operator.

(b) A durable nameplate shall be mounted on each transmitter showing the name of the manufacturer, the type or model designation, and providing suitable space for permanently displaying the transmitter serial number, FCC type approval number, and the class of station for which approved.

(c) The transmitter shall be designed, constructed, and adjusted by the manufacturer to operate on a frequency or frequencies available to the class of station for which type approval is sought. In designing the equipment, every reasonable precaution shall be taken to protect the user from high voltage shock and radio frequency burns. Connections to batteries (if used) shall be made in such a manner as to permit replacement by the user without causing improper operation of the transmitter. Generally accepted modern engineering principles shall be utilized in the generation of radio frequency currents so as to guard against unnecessary interference to other services. In cases of harmful interference arising from the design, construction, or operation of the equipment, the Commission may require appropriate technical changes in equipment to alleviate interference.

(d) Controls which may effect changes in the carrier frequency of the transmitter shall not be accessible from the exterior of any unit unless such accessibility is specifically approved by the Commission.

§ 19.52. *Test procedure.* Type approval tests to determine whether radio equipment meets the technical specifications contained in this part will be conducted under the following conditions:

(a) Gradual ambient temperature variations from 0° to 125° F.

(b) Relative ambient humidity from 20 to 95 percent. This test will normally consist of subjecting the equipment for at least three consecutive periods of 24 hours each, to a relative ambient humidity of 20, 60, and 95 percent,

respectively, at a temperature of approximately 80° F.

(c) Movement of transmitter or objects in the immediate vicinity thereof.

(d) Power supply voltage variations normally to be encountered under actual operating conditions.

(e) Additional tests as may be prescribed, if considered necessary or desirable.

§ 19.53. *Certificate of type approval.* A certificate or notice of type approval, when issued to the manufacturer of equipment intended to be used or operated in the Citizens Radio Service, constitutes a recognition that on the basis of the test made, the particular type of equipment appears to have the capability of functioning in accordance with the technical specifications and regulations contained in this part: *Provided,* That all such additional equipment of the same type is properly constructed, maintained and operated: *And provided further,* That no change whatsoever is made in the design or construction of such equipment except upon specific approval by the Commission.

§ 19.54. *Acceptance of composite equipment.* (a) Class B and non-crystal controlled Class C or Class D station equipment constructed by a manufacturer in lots of less than 100 units will not, in the usual case, be tested by the Commission for the purpose of granting type approval. Except as provided in paragraph (b) of this section, an applicant in this service who proposes to use or operate composite or other equipment which has not been type approved shall supply complete information showing that the equipment fully complies with appropriate station requirements, using supplementary sheets which shall accompany the standard application form. The Commission may, at its discretion, require that such equipment or a prototype thereof be made available to its laboratory at Laurel, Maryland, for testing in accordance with the procedures described elsewhere in this part, as applicable to equipment to be manufactured in lots of more than 100 units. In addition, field tests as deemed necessary or desirable may be carried out by authoritized Government personnel to determine the reliability of the equipment under operating conditions comparable to those encountered in actual service.

(b) In the case of Class C or Class D equipment employing crystal control, supplemental technical information is not required to accompany the standard application form: *Provided, however,* That it is clearly indicated that the equipment employs crystal control: *And provided further,* That the Commission may require the applicant to certify that the frequency stability of the crystal-controlled transmitter is within the tolerance specified elsewhere in this part.

SUBPART D—STATION OPERATING REQUIREMENTS

§ 19.61. *Permissible communications.* (a) Each station in the Citizens Radio Service is authorized to communicate with other stations in the same service. Communications with stations licensed under other parts of this chapter or with any United States Government or foreign station is prohibited, except for communications relating to civil defense in accordance with the provisions of § 19.93.

(b) Any station licensed in this service may be used to provide a radiocommunication service to any person, including the licensee of another station in the same service, on a strictly voluntary and no-charge basis; however, no other form of cooperative or shared use of facilities licensed in this service shall be permitted.

(c) All communications shall be limited to the minimum practicable transmission time.

(d) A citizens radio station may not be used for any purpose contrary to federal, state, or local law; or to carry communications for hire; or to carry program material of any kind either directly or indirectly for use in connection with radio broadcasting; or for direct transmission to the public through public address systems or by any other means.

(e) The licensee of any station in this service may, during a period of emergency in which normal communications facilities are disrupted or inadequate as a result of hurricane, flood, earthquake, enemy action, or similar disaster, utilize such station for emergency communications without regard to the provisions of this section other than the following:

(1) As soon as possible after the beginning of such emergency use, notice shall be sent to the Commission in Washington, D.C., or to the Engineer in Charge of the Radio District in which the station is located, stating the nature of the emergency and the use to which the station is being put;

(2) The emergency use of the station shall be discontinued as soon as substantially normal communication facilities are again available, and the Commission in Washington, D.C., or the Engineer in Charge, shall be notified immediately when such special use of the station is terminated; and

(3) The Commission may at any time order discontinuance of such special use of the authorized facilities.

(f) Except as provided in paragraph (h) of this section, a citizens radio station used to control remote objects or devices by means of radio, or to remotely actuate devices which are used as a means of attracting attention, shall not be operated in a manner which involves the continuous radiation of energy.

(g) Except as provided in paragraph (h) of this section, a citizens radio station which is used for the purpose of communication by radiotelephony shall not emit a carrier wave unless modulated for the purpose of communication, and a citizens radio station which is used for the purpose of communication by radiotelegraphy of any type shall not emit a carrier wave except when telegraph signals are being transmitted.

(h) A citizens radio station may transmit a continuous carrier, without being modulated by any form of communication or signal, under the following conditions only:

(1) When transmitting for brief tests or when adjustments are being made to the transmitter; or

(2) When a station which is being used to control model aircraft by means of interrupted tone modulation is actually controlling such aircraft in flight.

§ 19.62. *Station identification.* The registered serial number appearing on each citizens radio station license shall be the call sign assigned to such station. A citizens radio station shall transmit its call sign at the beginning and at the termination of all communications as well as at least once every ten minutes during every transmission of more than ten minutes' duration: *Provided,* That, in the case of stations conducting an exchange of several transmissions in sequence with each transmission less than three minutes' duration, the call sign of the communicating stations need be transmitted only once every ten minutes of operation. Stations operated solely for the radio control of remote objects or devices, or to remotely actuate devices which are used solely as a means of attracting attention, are not required to identify their transmissions except upon specific instructions of the Commission.

§ 19.63. *Remote control.* A Class A citizens radio base or fixed station may be authorized to be used or operated by remote control from another fixed location or from mobile units: *Provided,* That adequate means are available to enable the person using or operating the station to render the transmitting equipment inoperative from the remote control position or positions should improper operation occur. The authority for such remote control shall be shown on the station authorization.

§ 19.64. *Suspension of transmissions required.* The radiations of the transmitter shall be suspended immediately upon detection or notification of a deviation from the technical requirements of the rules in this part until such deviation is corrected.

§ 19.71. *Operator requirements.* (a) Except for stations using manually operated telegraphy transmitting by any type of the Morse Code, no operator license is required for the operation of a citizens radio station during the course of normal rendition of service.

(b) Stations using manually operated telegraphy transmitting by any type of the Morse Code may, during the course of normal rendition of service, be operated only by the holders of either a Radiotelegraph Third Class Operator Permit or a higher class of radiotelegraph operator license (except the holders of Temporary Limited Radiotelegraph Second Class Operator Licenses).

(c) In any case, however, all transmitter adjustments or tests during or coincident with the installation, servicing, or maintenance of a radio station, which may affect the proper operation of such station, shall be made by or under the immediate supervision and responsibility of a person holding a first or second-class commercial radio operator license, either radiotelephone or radiotelegraph, as may be appropriate for the type of emission employed, and such person shall be responsible for the proper functioning of the station equipment.

§ 19.72. *Posting of station license.* (a) The current authorization of each citizens radio station operated at a fixed location shall be permanently posted at the principal fixed location from which the station is controlled when being operated, and a photocopy thereof shall be permanently posted at all other fixed locations (if any) from which the station is controlled. In addition, if the transmitter of any such station is not readily accessible for inspection by Commission representatives or is not in view from at least one location at which the station license or a photocopy thereof is required to be posted, an executed Transmitter Identification Card (FCC Form 452-C, Revised) shall be affixed to that transmitter.

(b) The current authorization of each citizens radio station operated as a mobile station or operated at temporary locations may be retained in the permanent records of the station and need not be posted; however, an executed Transmitter Identification Card (FCC Form 452-C, Revised) shall be affixed to each transmitter which is operated as a mobile station or is operated at temporary locations, and to the control equipment of each such transmitter in every case where such transmitter is not in view from the location from which the station is controlled.

(c) The following information shall be entered on each Transmitter Identification Card (FCC Form 452-C, Revised) which is used for transmitter or station identification in accordance with the foregoing:

(1) Name of the station licensee;

(2) Station call sign assigned by the Commission (see § 19.62);

(3) Exact location or locations of the permanent station records;

(4) Frequency or frequencies upon which the associated transmitter is adjusted to operate; and

(5) Signature of the licensee.

§ 19.73. *Inspection of stations.* All stations and records of stations in the Citizens Radio Service shall be made available for inspection upon request of an authorized representative of the Commission made to the licensee or to his representative.

§ 19.74. *Inspection and maintenance of tower marking and associated control equipment.* The licensee of any radio station which has an antenna structure required to be painted or illuminated pursuant to the provisions of section 303 (q) of the Communications Act of 1934, as amended, and/or Part 17 of this chapter, shall operate and maintain the tower marking and associated control equipment in accordance with the following:

(a) The tower lights shall be observed at least once each 24 hours, either visually or by observing an automatic and properly maintained indicator designed to register any failure of such lights, to insure that all such lights are functioning properly as required; or, alternatively, there shall be provided and properly maintained an automatic alarm system designed to detect any failure of the tower lights and to provide indication of such failure to the licensee.

(b) Any observed or otherwise known failure of a code or rotating beacon light or top light not corrected within thirty minutes, regardless of the cause of such failure, shall be reported immediately by telephone or telegraph to the nearest Air Traffic Communications Station or office of the Federal Aviation Agency. Further notification by telephone or telegraph shall be given immediately upon resumption of the required illumination.

(c) All automatic or mechanical control devices, indicators, and alarm systems associated with the tower lights shall be inspected at intervals not to exceed three months, to insure that such apparatus is functioning properly.

(d) All lighting shall be exhibited from sunset to sunrise unless otherwise specified in the instrument of station authorization.

(e) A sufficient supply of spare lamps shall be maintained for immediate replacement purposes at all times.

(f) All towers shall be cleaned or repainted as often as is necessary to maintain good visibility.

§ 19.81. *Answers to notices of violations.* (a) Any licensee who appears to have violated any provision of the Communications Act or any provision of this chapter shall be served with a written notice calling the facts to his attention and requesting a statement concerning the matter. FCC Form 793 may be used for this purpose.

(b) Within 10 days from receipt of notice or such other period as may be specified, the licensee shall send a written answer, in duplicate, direct to the office of the Commission originating the official notice. If an answer cannot be sent nor an acknowledgment made within such period by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay.

(c) The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to violations that may be due to the physical or electrical characteristics of transmitting apparatus, the answer shall state fully what steps, if any, have been taken to prevent future violations, and, if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and the promised date of delivery. If the installation of such apparatus requires a construction permit, the file number of the application shall be given, or if a file number has not been assigned by the Commission, such identification shall be given as will permit ready identification of the application. If the notice of violation relates to lack of attention to or improper operation of the transmitter, the name and license number of the operator in charge shall be given.

§ 19.82. *Recording of tower light inspections.* When a station in this service has an antenna structure which is required to be illuminated, appropriate entries shall be made in the station records, and retained for a period of at least one year, as follows:

(a) The time the tower lights are turned on and off each day, if manually controlled.

(b) The time the daily check of proper operation of the tower lights was made.

(c) In the event of any observed or otherwise known failure of a tower light:

(1) Nature of such failure.

(2) Date and time the failure was observed or otherwise noted.

(3) Date, time, and nature of the adjustments, repairs, or replacements made.

(4) Identification of the Air Traffic Communications Station (or office of the Federal Aviation Agency) notified of the failure of any code or rotating beacon light not corrected within thirty minutes, and the date and time such notice was given.

(5) Date and time notice was given to the Air Traffic Communications Station (or office of the Federal Aviation Agency) that the required illumination was resumed.

(d) Upon completion of the three-month periodic inspection required by § 19.74 (c):

(1) The date of the inspection and the condition of all tower lights and associated tower lighting control devices, indicators, and alarm systems.

(2) Any adjustments, replacements, or repairs made to insure compliance with the lighting requirements and the date such adjustments, replacements, or repairs were made.

§ 19.83. *False signals.* No person shall transmit false or deceptive signals or communications by radio, or identify the station he is using or operating by means of a call sign or signal which has not been assigned by proper authority to that station, or refuse to properly identify himself and the radio station he is using or operating when such identification is possible under the conditions of use or operation in effect at the time such identification is requested.

§ 19.91. *Station location.* (a) The specific location of each Class A base station and each Class A fixed station and the specific area of operation of each Class A mobile station shall be indicated in the application for license. Authorization will not be granted for the operation of a base station or a fixed station in this service at unspecified temporary fixed locations.

(b) A Class A mobile station authorized in this service may be used or operated anywhere in the United States subject to the provisions of paragraph (d) of this section: *Provided,* That when the area of operation is changed for a period exceeding seven days, the following procedure shall be observed:

(1) When the change of area of operation occurs inside the same Radio District, the Engineer in Charge of the Radio District involved and the Commission's office, Washington 25, D.C., shall be notified.

(2) When the station is moved from one Radio District to another, the Engineers in Charge of the two Radio Districts involved and the Commission's office, Washington 25, D.C., shall be notified.

(c) A Class B, Class C, or Class D mobile station may be used or operated anywhere in the United States subject to the provisions of paragraph (d) of this section.

(d) A mobile station authorized in this service may be used or operated on any craft or vehicle: *Provided,* That when such craft or vehicle is outside the territorial limits of the United States, the station, its operation, and its operator shall be subject to the governing provisions of any treaty concerning telecommunications to which the United States is a party, and when within the territorial limits of any foreign country, the station shall be subject also to such laws and regulations of that country as may be applicable.

§ 19.92. *Control of transmitters.* All transmitters licensed in the Citizens Radio Service must at all times be under the control of the licensee. The licensee shall not transfer, assign, or dispose of, in any manner, directly or indirectly, the operating authority under his station license.

§ 19.93. *Civil defense communications.* A licensee of a station authorized under this part may use the licensed radio facilities for the transmission of messages relating to civil defense activities in connection with official tests or drills conducted by, or actual emergencies proclaimed by, the civil defense agency having jurisdiction over the area in which the station is located: *Provided,* That:

(a) The operation of the radio station shall be on a voluntary basis.

(b) The operation of the station shall not conflict with CONELRAD requirements.

(c) Such communications are conducted under the direction of civil defense authorities.

(d) As soon as possible after the beginning of such use, the licensee shall send notice to the Commission in Washington, D.C., and to the Engineer in Charge of the Radio District in which the station is located, stating the nature of the communications being transmitted and the duration of the special use of the station. In addition, the Engineer in Charge shall be notified as soon as possible of any change in the nature of or termination of such use.

(e) In the event such use is to be a series of pre-planned tests or drills of the same or similar nature which are scheduled in advance for specific times or at certain intervals of time, the licensee may send a single notice to the Commission in Washington, D.C., and to the Engineer of the Radio District in which the station is located, stating the nature of the communications to be transmitted, the duration of each such test, and the times scheduled for such use. Notice shall likewise be given in the event of any change in the nature of or termination of any such series of tests.

(f) The Commission may, at any time, order the discontinuance of such special use of the authorized facilities.

4. Amateur Radio

"Amateur Radio" is a misleading expression. There is little that could be considered amateurish about a majority of the people in this field. The hobby might be considered as the business of radio communications carried on for fun.

Many of the people that are "ham" radio operators make their living out of one phase or another of the electronics business; as engineers, scientists or technicians. Others are in fields far removed from radio. There are politicians, generals, movie actors, editors and disk jockeys that hold amateur radio licenses.

Despite the degree of professional competence that ham radio operators attain, and the many services that these people provide for their friends and for the community at large, they accept no type of compensation for what they do. Not only are they forbidden by FCC regulations from getting paid for their services, most of them would consider it an insult if payment were offered.

For half a century amateur radio operators have maintained a splendid record of assistance to the community in time of disaster. Through storms, floods and fires, ham radio communications have provided needed information in rescue operations and assisted in relief work.

Aside from this "heroic" side to ham radio, there are everyday ways in which the ham is of service to his community. If you have a relative in the armed services overseas, he may have called home or sent a radiogram by MARS, the Military Affiliate Radio System. This is an amateur-run network of stations that bridges the globe and provides free facilities to the serviceman overseas. The armed forces encourage this type of activity, because they recognize that the trained and enthusiastic ham operators provide a valuable reservoir of capable electronics personnel.

History

The first amateur radio operators, right after the turn of the century, were private experimenters whose imaginations had been caught by the reports of Marconi and other early electronic innovators. Indeed, during these early days all men engaged in any sort of electronic work could be considered amateurs, for there were no professionals.

By 1915 both the military and various private concerns had recognized

the value of radio communications. The government started to take a hand in the regulation of the air waves. Amateur operators were given wavelengths of 200 meters and below to play with; at that time these frequencies were considered to be of little value for long-distance communication.

The amateurs persisted and, gradually, were able to achieve distances of 500 and even occasionally 1000 miles on their allotted frequencies. But these frequencies were usually good only for short-distance communication, and radio amateurs became expert at techniques for relaying messages.

In 1917, with the outbreak of World War I, the government found that the abilities these amateurs had been developing in the past years would prove to be of great value in the war effort. Hundreds of skilled amateur radio operators were called into military service at the beginning of the war.

The Amateur Radio Relay League, an organization which had been formed in 1914 by Hiram Percy Maxim, reported that out of the 6,000 amateurs registered at the start of the war, over 4,000 of them served in the armed forces. (Mr. Maxim, the founder and president of the A.R.R.L from 1914 to 1936, was a driving force in the early days of amateur radio.)

After WW I the United States Government found itself in control of radio broadcasting. Within a month after the end of the war the Congress was considering the passage of legislation that would have made it impossible for amateur radio to continue.

Hiram Maxim managed to see that the bill was defeated, but there was still no rebirth of amateur radio. The wartime laws still remained in effect, and the offices of the A.R.R.L. stayed closed.

On October 1, 1919, the wartime ban on amateur radio operations lapsed, and thousands of prewar hams rushed to get back on the air. The magazine QST was bought by the League, and made the official organ of the A.R.R.L., and radio amateurs in general.

In the era between the two world wars the big craze in ham radio was DX, or distant communications. This was a time when every achievement was a "first," and every advance a contribution to the radio art. As the distances achieved by this 200-meter communications started to consistently reach 2,000 miles, amateurs started dreaming about crossing the Atlantic.

In December of 1921 the A.R.R.L. sent an expert ham operator, Paul F. Godley (2ZE) to Europe with sensitive equipment. He was able to log 30 American stations.

In 1932 European amateurs reported hearing 315 American calls, and United States hams logged two British and one French station.

But consistent communications across the Atlantic at 200 meters seemed impossible. The amateur community decided to try the only course opened to them, switching to another wavelength; one **below** 200 meters. According to the accepted electronic doctrine of the day, wavelengths below 200 meters would be useless for DX communications, but the same had been said about 200 meters, and for this reason they had left these frequencies to the amateurs.

In 1922 tests were made on the 130-meter band, with good results. In 1923 the A.R.R.L. sponsored tests down to 90 meters. The results were astounding. They indicated that as **the wavelength decreased, the distances actually increased!**

The short-wave era began in November, 1923, when Deloy (8AB),

in France, was worked for several hours by Schnell and Reinartz (1MO and 1XAM at that time, now W9UZ and K6BJ) on 110 meters.

By the following year communications across the Atlantic on 100 meters had become commonplace, and commercial companies were scurrying to set up stations operating at these frequencies. The situation rapidly approached chaos, and the first of a series of international conferences split the bands up and assigned frequencies to the various radio services. Amateur radio, through the A.R.R.L., gained a toehold on the 80-meter band and, with amazing foresight, even on the then-unusable 40, 20, 10 and even 5-meter bands.

Ham radio operators gave these new frequencies a try, and soon found themselves communicating regularly with South Africa and Australia on 40 meters. It could then be said truly that radio had come out of its infancy.

RADIO DISTRICTS IN THE UNITED STATES

#1 1600 Customhouse, Boston 9, Massachusets. COVERS: the states of Connecticut, Maine, Massachusets, New Hampshire, Rhode Island and Vermont.
TESTS: 8:20-10:00 a.m. Wednesdays, Thursdays and Fridays.

#2 748 Federal Building, 641 Washington Street, New York 14, New York. COVERS: Albany, Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rennsselaer, Richmond, Rockland, Schenectady, Suffolk, Sullivan, Ulster, and Westchester counties in New York; Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union and Warren counties in New Jersey.
TESTS: 9:00 a.m. Tuesday to Friday.

#3 1005 New U.S. Custom House 2nd and Chestnut Streets, Philadelphia 6, Pennsylvania. COVERS: Adams, Berks, Bucks, Carbon, Chester, Cumberland, Dauphin, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, North Hampton, Perry, Philadelphia, Schuylkill, and York counties in Pennsylvania; Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Ocean, and Salem counties in New Jersey; and the county of Newcastle in Delaware.
TESTS: 8:30 a.m. Mondays, Tuesdays and Wednesdays.

#4 415 U.S. Customhouse, Gay and Water Streets, Baltimore 2, Maryland. COVERS: the state of Maryland, except the part lying in District #24, Clark, Fairfax (except section in District #24), Fauquier, Frederick, Loudoun, Page, Prince William, Rappahannock, Shenandoah, and Warren counties in Virginia. Kent and Sussex counties in Delaware. Barbour, Berkeley, Grant, Hampshire, Hardy, Harrison, Jefferson, Lewis, Marion, Mineral, Monongalia, Morgan, Pendleton, Preston, Randolph, Taylor, Tucker and Upshur counties in West Virginia.
TESTS: 8:30-10:00 a.m. Mondays and Fridays, and by appointment.

#5 402 Federal Building, Norfolk 10, Virginia. COVERS: Virginia, except parts lying in Districts #4 and#24; North Carolina, except the part lying in District #6.
TESTS: All day Fridays.

#6 718 Atlanta National Building, 50 Whitehall Street, Atlanta 3, Georgia. COVERS: Georgia, South Carolina and Tennessee; Alabama, except the part lying in District #8; Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, McDowell, Macon, Madison, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga and Yancey counties in North Carolina.

TESTS: 8:30 a.m. Tuesdays and Fridays.

#7 312 Federal Building, Miami 1, Florida. COVERS: The state of Florida, except the county of Escambia (in District #8).
TESTS: 9:00 a.m. Thursdays.

#8 608 Federal Office Building, 600 South Street, New Orleans, Louisiana. COVERS: The states of Arkansas, Louisiana, and Mississippi; the city of Texarkana in Texas; the county of Escambia in Florida; Mobile and Baldwin counties in Alabama.
TESTS: 8:30 a.m. on Mondays.

#9 324 U.S. Appraisers Building, 7300 Wingate Street, Houston 11, Texas. COVERS: Angelina, Arkansas, Atascosa, Austin, Bandera, Bastrop, Bee, Brooks, Bexar, Blanco, Brazoria, Brazos, Burleson, Caldwell, Calhoun, Cameron, Chambers, Colorado, Comal, DeWitt, Duval, Dimmit, Edwards, Fayette, Fort Bend, Frio, Galveston, Gillespie, Goliad, Gonzales, Grimes, Guadalupe, Hardon, Hays, Haris, Hidalgo, Jackson, Jasper, Jefferson, Jim Hogg, Jim Wells, Karnes, Kennedy, Kendall, Kerr, Kinney, Kleberg, LaSalle, Lavaca, Lee, Liberty, Live Oak, Matagorda, Madison, Maverick, McMullin, Medina, Montgomery, Nacogdoches, Newton, Nueces, Orange, Polk, Real, Refugio, San Augustine, San Jacinto, San Patricio, Sabine, Starr, Travis, Trinity, Tyler, Uvalde, Val Verde, Victoria, Walker, Waller, Washington, Webb, Wharton, Willacy, Williamson, Wilson, Zapata and Zavala counties in Texas.
TESTS: 9:00 a.m. Tuesdays.

#10 Room 401 States General Life Insurance Building, 708 Jackson Street, Dallas 2, Texas. COVERS: Texas, except the part lying in District #9 and the city of Texarkana (District #8); Oklahoma.
TESTS: 9:00 a.m. Tuesdays.

#11 Mezzanine 50, 849 South Broadway, Los Angeles 14, California. COVERS: Arizona; Clarke county in Nevada; Imperial, Inyo, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties in California.
TESTS: 9:00 a.m. and 1:00 p.m. Wednesdays.

#12 323-A Customhouse, 555 Battery Street, San Francisco 26, California. COVERS: California, except the part lying in District #11; Nevada, except for Clarke county.
TESTS: 9:00 a.m. Fridays.

#13 201 U.S. Courthouse, 620 S.W. Main Street, Portland 5, Oregon. COVERS: Oregon; Idaho, except the part lying in District #14; Wahkiakum, Cowlitz, Clark, Skamania and Klickitat counties in Washington.
TESTS: 8:45 a.m. Fridays.

#14 806 Federal Office Building, 1st Avenue & Marion, Seattle 4, Washington. COVERS: Montana; Washington, except the parts lying in District #13; Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, and Shoshone counties in Idaho.
TESTS: 9:00 a.m. Fridays.

#15 521 New Coustomhouse, Denver, 2, Colorado. COVERS: Colorado, Utah, and Wyoming; Banner, Box, Butte, Cheyenne, Dawes, Deuel, Garden, Kimball, Morrill, Scottsbluff, Sherida, and Sioux counties in Nebraska; Butte, Custer, Fall River, Lawrence, Meade, Pennington, Shannon and Washington counties in South Dakota.
TESTS: 8:00 a.m. the first two Thursdays of the month.

#16 208 Federal Court Building, 6th and Market Street, Saint Paul 2, Minnesota. COVERS: Minnesota and North Dakota; South Dakota, except for the part in District #15; Alger, Baraga, Chippewa. Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Meno-

minee, Ontonagon, and Schoolcraft counties in Michigan.
TESTS: 8:45 a.m. Fridays.

#17 3100 Federal Office Building, 911 Walnut Street, Kansas City 6E, Missouri. COVERS: Kansas and Missouri; Iowa, except the part lying in District #18; Nebraska, except the part lying in District #15.
TESTS: 8:30 a.m. Thursdays and Fridays.

#18 826 U.S. Courthouse, 219 South Clark Street, Chicago 4, Illinois. COVERS: Illinois and Indiana; Allamakee, Buchanan, Cedar, Clayton, Clinton, Delaware, Des Moines, Dubuque, Fayette, Henry, Jackson, Johnson, Jones, Lee, Linn, Louisa, Muscatine, Scott, Washington, and Winneshiek counties in Iowa; Brown, Columbia, Calumet, Crawford, Dane, Dodge, Door, Fond du Lac, Green, Iowa, Jefferson, Keewane, Kenosha, Lafayette, Manitowoc, Marinette, Milwaukee, Ozaukee, Oconto, Outagamie, Racine, Richland, Rock, Sauk, Sheboygan, Walworth, Washington, Waukesha, and Winnebago counties in Wisconsin; Kentucky, except for that part lying in District #19.
TESTS: 9:00 a.m. Fridays.

#19 1029 New Federal Building, Detroit 26, Michigan. COVERS: Ohio; Michigan, except for the part lying in District #16; West Virginia, except for the part lying in District #4; Bath, Bell, Boone, Bourbon, Boyd, Bracken, Breathitt, Campbell, Carter, Clark, Clay, Elliott, Estill, Fayette, Fleming, Floyd, Franklyn, Gallatin, Garrard, Grant, Greenup, Kenton, Harlan, Harrison, Jackson, Jessamine, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Lincoln, Madison, Magoffin, Martin, Mason, McCreary, Menifee, Montgomery, Morgan, Nicholas, Owen, Owsley, Pendleton, Perry, Pike, Powell, Pulaski, Robertson, Rockcastle, Rowan, Scott, Wayne, Whitley, Wolfe, and Woodford counties in Kentucky.

#20 328 Post Office Building, Ellicott and Swan Streets, Buffalo 3, New York. COVERS: New York, except the part in District #2; Pennsylvania, except for the part in District #3.
TESTS: 9:00 a.m. First and Third Fridays of each month.

#21 503 Federal Building, P.O. Box 1021, Honolulu 13, Hawaii. COVERS: Hawaii, and outlying Pacific possessions (except Alaska and adjacent islands).
TESTS: Tuesdays, Wednesdays and Thursdays, 8:00-9:30 a.m. and by appointment.

#22 322 Federal Building, P.O. Box 2987, San Juan 12, Puerto Rico. COVERS: Puerto Rico, and the Virgin Islands.
TESTS: 9:00 a.m. Fridays.

#23 Room 53, U.S. Post Office and Courthouse Building, P.O. Box 644, Anchorage, Alaska. COVERS: Alaska and adjacent islands.
TESTS: In May—Contact office for date.

#24 Room 106, 718 Jackson Place, N.W. Washington 25, D.C. COVERS: the District of Columbia and ten miles beyond the boundary of the District of Columbia in every direction.
TESTS: 9:30 a.m. and 1:00 p.m. on Tuesdays and Fridays.

TESTS GIVEN PERIODICALLY IN OTHER CITIES, CONTACT THE FCC FOR FURTHER INFORMATION.

Getting An Amateur License

Amateur radio is regulated not only by statute within the United States but by several international agreements. The radio ham is allowed to broadcast with up to 1,000 watts power, and to alternate his frequency to suit the transmitting conditions (within a tightly restricted range). In return for these privileges, the ham radio operator is expected to have a degree of professional competence in handling his equipment.

The misuse of high-powered electronic communications equipment can not only play havoc with the commercial radio stations in the area, but can actually be physically dangerous. A transmitter radiating 1,000 watts of power has enough high voltage circuitry in its chassis to electrocute the unwary very efficiently.

The Federal Communications Commission, which regulates amateur radio and all other electronic communications within the United States, has established six classes of amateur radio licenses: Novice, Technician, Conditional, General, Extra, and Advanced. This is a comparatively recent classification system, based upon years of observing the needs of the amateur radio operator.

All licenses are issued by the FCC, after a series of tests to assure the necessary degree of competence on the part of the applicant. The FCC also polices the amateur bands to see that Federal regulations are observed by the operators.

The Novice and Technician Class licenses are the easiest to get, these classes being set up to allow people just getting started in amateur radio to reach the technical competence needed to use the extra privileges of the more advanced class licenses by actual practice in the field. A beginner can easily master the requirements for the Novice Class license and, in the year that this license is valid, gradually increase his skills and knowledge to the point of being able to pass a more advanced test.

The Novice License

The Novice Class license is the steppingstone toward getting the Conditional or General Class license. A Novice Class license is good only for one year from the date of issue and cannot be renewed. Also, if you have ever held any sort of U.S. amateur radio license before, you are no longer eligible for the Novice license.

The test for the Novice license is in two parts; a test of the applicant's ability to send and receive Morse code at the speed of 5 words per minute, and a simple multiple-choice written examination with the stress on a basic amount of radio theory and on the rules and regulations of the

LAFAYETTE Model KT-320 Receiver

HALLICRAFTERS Model SX-115 Receiver

HALLICRAFTERS Model SX-117 Receiver

FCC that pertain to the Novice.

The license is available only by mail, and is given under the supervision of someone over the age of 21 who holds a General Class license or higher (or a commercial radiotelegraph license).

In order to apply for your license write to the FCC office in your district (see list on page 00) and ask for Amateur License Application Form 610. When you receive the form, find someone who fits the qualifications in the above paragraph and is willing to give you the test. If you don't have any friends who are ham operators, get the address of an amateur radio club in your area and ask their assistance, they will usually be glad to help.

Your volunteer supervisor will start by giving you the code test. This is in two parts; a five-minute transmission at 5 w.p.m. which you must copy for at least one consecutive minute without error, and a test of your sending, If you pass the test you fill out the FCC form 610 and give it to your examiner.

The examiner is to send the completed form to **the Federal Communications Commission, Gettysburg, Pennsylvania 17325,** along with a letter including the following information:

(1) your name and address
(2) your examiner's name and address
(3) the class of license you are applying for
(4) the fact that you passed the code test under his supervision, and the date that you passed it (within ten days of mailing the letter)
(5) a request for the written test
(6) a statement by the volunteer examiner that he is over 21 years old and holds either an amateur license of General, Advanced, or Extra Class, or a commercial radiotelegraph license. (If an amateur license, the call-sign should be mentioned.)

A person in the service of the United States Government as the operator of a manually operated radiotelegraph station is also authorized to give the test.

The written test, which the FCC will mail directly to the volunteer examiner, consists of twenty multiple-choice questions with five choices for each question. The examiner will hand you the questions and the answer sheet, and you will take the test in his presence and, of course, without help. When you finish the test you hand it back to the volunteer examiner. He will put it into an envelope, which you supply for him, and mail it back to the FCC office that sent it to him along with a statement certifying that you underwent the examination in his presence and without assistance.

If you pass the examination the FCC will mail you your Novice Class license, complete with call letters, within a few weeks. Don't bother requesting special call letters; as a novice operator you couldn't possibly qualify for them. (The special circumstances under which the FCC will allocate such calls are outlined below.)

If you don't manage to pass the examination the first time you take it, spend the next month studying for it again. You are eligible to take it again after a 30-day waiting period.

THE "Q" CODE

Those signals most often used in amateur radio work. If the signal is sent with a question mark following, it then takes the form of a question.

QRG What is my exact frequency? . . . Your exact frequency is . . .

QRH Does my frequency vary? . . . Your frequency varies.

QRI What is the tone of my transmission? The tone of your transmission is . . . (1-good; 2-variable; 3-bad)

QRK What is the readability of my signals? . . . The readability of your signals is . . . (1-unreadable; 2-partly readable; 3-almost readable; 4-readable; 5-perfectly readable)

QRL Are you busy? . . . I am busy.

QRM Are you being interfered with? . . . I am being interfered with.

QRN Are you troubled by static? . . . I am troubled by static.

QRQ Shall I send faster? . . . Send faster (. . . words per minute).

QRS Shall I send more slowly? . . . Send more slowly (. . . words per minute).

QRT Shall I stop sending? . . . Stop sending.

QRU Have you anything for me? . . . I have nothing for you.

QRV Are you ready? . . . I am ready.

QRW Shall I tell . . . that you are calling him on . . . kc's? . . . Please tell . . . that I am calling him on . . . kc's.

QRX When will you call me again? . . . I will call you again at . . . hours (on . . . kc).

QRZ Who is calling me? You are being called by . . . (on . . . kc).

QSA What is the strength of my signals? . . . The strength of your signals is . . . (1-barely heard; 2-weak; 3-fairly good; 4-good; 5-very good).

QSB Are my signals fading? . . . Your signals are fading.

QSD Is my keying defective? Your keying is defective.

QSG Shall I send . . . messages at a time? Send . . . messages at a time.

QSL Can you acknowledge receipt? I am acknowledging receipt.

QSM Shall I repeat the last message which I sent you, or some previous message? Repeat the last message (or message (s) number (s) . . .)

QSO Can you communicate with . . . direct, or by relay? . . . I can communicate with . . . direct (or by relay through . . .).

QSP Will you relay to . . . ? . . . I will relay to . . .

QSV Shall I send a series of V's on this frequency (or . . . kc)? Send a series of V's on this frequency (or . . . kc).

QSW Will you send on this frequency? . . . I will send on this frequency.

QSX Will you listen to . . . on . . . kc? . . . I am listening to . . . on . . . kc.

QSY Shall I transmit on another frequency? . . . Transmit on another frequency.

QSZ Shall I send each word or group more than once? . . . Send each word or group twice (or . . . times).

QTA Shall I cancel message No. . . . as if it had not been sent? Cancel message number . . . as if it had not been sent.

QTB Do you agree with my counting of words? I do not agree with your counting of words, I will repeat the first letter or digit of each word or group.

QTC How many messages have you to send? . . . I have . . . messages for you.

QTH What is your location? My location is . . .

QTR What is the exact time? . . . The exact time is . . .

Special abbreviations adopted by the A.R.R.L.:

QST General call preceding a message to all amateurs and ARRL members, this is, in effect "CQ ARRL"

QRRR Official ARRL "land SOS." A distress call for emergency use only by a station in an emergency situation.

The Technician License

The test for the Technician Class license is the same as that for the General Class, but with an easier requirement. This class was designed for the electronic experimenter who wishes to be able to utilize the higher frequency bands.

To comply with the general international radio communications regulation that all people authorized to use radio transmitting equipment know CW (code) operation. There is also a code requirement with this license. This requires that you are able to copy at least 25 consecutive letters accurately out of 25 5-letter groups sent at 5 w.p.m. Thus, while the technical part of the test is more difficult than the Novice Class examination, the code section is easier.

You may apply for both the Novice and Technician Class licenses simultaneously, or for a Novice Class first and then a Technician Class, but you cannot apply for a Novice Class license after you have a Technician Class.

The regulations for applying for the license and taking the tests are the same as for the Novice Class license.

The General License

At the present time, the holder of a General Class license has all of the privileges the FCC grants to the amateur radio fraternity. The written test, identical with that for the Technician Class, is rigorous, and the code requirement is 13 w.p.m.

The examination for this class of license is given only at one of the test centers maintained by the FCC. The tests are given periodically, and the approximate dates of the tests as well as the addresses of all the FCC centers are listed on a chart in this chapter.

The Conditional License

If—**and only if**—you either live more than 75 miles away from the nearest FCC examination center, or are physically handicapped in some way that prevents you from traveling to the center, then you may take the Conditional Class license examination by mail. The Conditional Class license will give you all of the operating privileges of the General Class.

The mail application is handled in the same way as that for the Novice Class license. If you are applying for it on the basis of a physical handicap, you should obtain a certification of your physical condition from your doctor and have your volunteer examiner include it in with the application blank and his letter to the FCC.

The Extra Class

You may apply for an Extra Class license after you have held the General or Conditional Class for at least two years. In order to pass the examination you will have to be able to send and receive Morse code at 20 w.p.m. and to pass a difficult theory section.

As of this writing there is no advantage in holding the Extra Class license; all amateur privileges are granted to the holders of General and Conditional Class licenses, but the

THE R-S-T SYSTEM

READABILITY

1. Unreadable.
2. Barely readable, occasional words distinguishable.
3. Readable with considerable difficulty.
4. Readable with practically no difficulty.
5. Perfectly readable.

SIGNAL STRENGTH

1. Faint signals, barely perceptable.
2. Very weak signals.
3. Weak signals.
4. Fair signals.
5. Fairly good signals.
6. Good signals.
7. Moderately strong signals.
8. Strong signals.
9. Extremely strong signals.

TONE

1. Extremely rough hissing tone.
2. Very rough a.c. tone, no trace of musicality.
3. Rough low-pitched a.c. tone, slightly musical.
4. Rather rough a.c. tone, fairly musical.
5. Musically-modulated tone.
6. Modulated tone, slight trace of whistle.
7. Near d.c. tone, smooth ripple.
8. Good d.c. tone, just a trace of ripple.
9. Purist d.c. tone.

The following letters may be added to the end of the RST report:

X—The signal has the characteristic steadyness of crystal control.

C—There is a chirp in the signal.

K—There is a click in the signal.

When reporting on a voice transmission, leave out the "tone" indication.

prestige value within the circles of amateur radio is great.

The Advanced Class

At the present time, there is no Advanced Class amateur license. It was eliminated in 1951, when the Novice and Technician Classes were introduced. The FCC is, however, considering a proposal to start reissuing Advanced Class licenses, upon passing an examination, to those who have held General or Conditional Class licenses for over a year. If this proposal goes through, certain frequencies in the 15, 20, 40 and 75 meter bands presently allocated for amateur phone use would be restricted to holders of the Advanced Class license.

The test for the Advanced Class would not contain any code qualification, and would be harder than the General Class test, but not as hard as that for the Extra Class. You will have to check with QST or your local ham radio club to keep up with what's happening on this question.

Getting a Special Call

There are three ways of getting a special amateur radio call sign.

(1) If you had one of the old two-letter calls you can now get it issued to you again provided no one else is already using it.

(2) An amateur radio club may request the call-sign of one of its members who has died, to use this call as that of the club's own radio station.

(3) Special calls will be issued for temporary purposes, such as ham stations set up at fairs or conventions. One example is the temporary call—W2US—issued to the ham radio station set up at the Worlds Fair in New York City to operate for the duration of the Fair.

The FCC charges a twenty-dollar

fee to issue these special calls, so be warned before you make your application.

Studying for the Novice Exam

There are two essentials necessary to pass the Federal Communications Commission examination for the Novice Class license: a knowledge of Morse code and a knowledge of theory.

The following chapter in this book deals with the learning of Morse code; consult that for all the information you need.

It would be outside the scope of this book to try to provide you with the knowledge of radio theory needed to pass the exam. The A.R.R.L. has published two excellent booklets on the subject: **How to Become a Radio Amateur** and **The Radio Amateur's License Manual.** Study these two booklets and you won't have any trouble passing your Novice Class license examination. Both of these booklets sell for 50 cents.

During the year that you will hold the Novice Class license you will find that, if you continue copying and transmitting cw (continuous wave, or Morse code) your code speed will have increased to the required limit for one of the more advanced licenses. Your knowledge of the theory and practice of amateur radio will also increase greatly once you get on the air with your Novice ticket. You will find that the majority of your fellow hams will honestly be pleased with the opportunity to help you get started in this fascinating hobby. Their only request will be that, once you are helped and get your own General Class permit, you help some other novice discover the pleasures of amateur radio.

EQUIPMENT

Receivers

A good receiver is actually the single most important investment a ham radio operator can make. No matter how powerful or efficient your transmitter is, it does you no good at all

HALLICRAFTERS Model HT-44 Transmitter

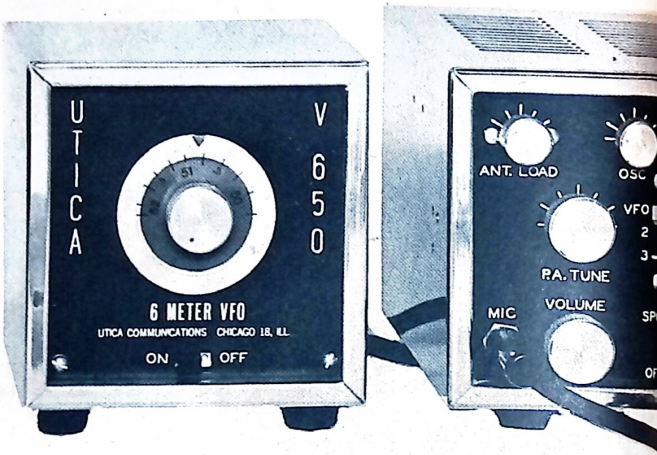
HALLICRAFTERS Model HT-32B Transmitter

HALLICRAFTERS Model HT-33B Linear Amplifier

THE INTERNATIONAL PHONETIC ALPHABET

for use in voice communication

A	Alpha	M	Mike	Y	Yankee
B	Bravo	N	November	Z	Zulu
C	Charlie	O	Oscar	O	Ze-ro
D	Delta	P	Papa	1	Wun
E	Echo	Q	Quebec	2	Too
F	Foxtrot	R	Romeo	3	Th-uh-ree
G	Golf	S	Sierra	4	Fo-wer
H	Hotel	T	Tango	5	Fi-iv
I	India	U	Uniform	6	Six
J	Juliet	V	Victor	7	Sev-en
K	Kilo	W	Whiskey	8	Ait
L	Lima	X	X-Ray	9	Niner



UTICA Model 650 Transmitter with microphone

if your receiver isn't up to par. There's an old ham saying to the effect that "if you can't hear them, you can't work them."

Receivers come in all shapes, sizes and prices. You will have to match the capabilities you require with the price you wish to pay.

The important points of receiver operation are its **sensitivity** and **selectivity**. Sensitivity refers to the receiver's ability to pick up weak signals; selectivity is the ability to discriminate between signals close together in broadcasting frequency.

Other important points to consider are stability and ease of tuning. A stable receiver is one that will not drift off the frequency to which it is tuned. Some receivers have a tendency to be slightly unstable, especially when they have been turned on for under half an hour; the electrical value of some of the components changes slightly while the receiver heats up. A receiver that drifts has to be constantly returned to keep it on the frequency you are using.

The price range on radio receivers runs from about 30 to several thousand dollars. As a general rule, receivers selling for under 80 dollars (or about 50 in kit form) aren't adequate for use in amateur radio work. By the same token, the more money you spend the more receiver you get. The point of diminishing returns is reached at about 300 dollars; after this the increase in price does not give you as much of a corresponding increase in value. A receiver selling for 500 dollars, for example, is un-

deniably better, and has more features, than one selling for 300. But the difference is not nearly as much as that between a receiver selling for 300 and one selling for 100.

There are two general types of medium-price-range amateur receivers, the general-coverage type and the receiver that tunes to the ham bands only. The general coverage receivers usually tune from .5 to 30mc in four or more bands. The ham-bands-only machine will tune in a series of bands that cover only the frequencies allocated for use by amateur radio operators. When considering two such receivers of comparable prices, remember that the ham-band-only machine will give you better coverage of the amateur radio frequencies—but at the sacrifice of the ability to tune in the rest of the radio spectrum.

Communications receivers made by reputable companies are all competitively priced; if you choose carefully, your receiver should give you many years of service. If you buy your receiver as a novice, remember that you will not always remain a novice, and choose a receiver that will do what you will require of it when you proceed to a more advanced class.

Transmitters

Transmitters for use by the Novice must be crystal controlled. If you pick a crystal controlled cw transmitter that covers the ham bands between 3.5 and 30 mc, delivering 50-75 watts, you will have a fairly inexpensive

transmitter that will suit your needs well.

When you get your General or Conditional Class license, you can either put a VFO (variable frequency oscillator—to replace the crystal) unit in your Novice transmitter, or trade the transmitter in on a new one. The governing fact in determining the price of a transmitter is the power output. In considering how much to spend on the transmitter remember that a lot of people manage to work DX quite well with comparatively low-powered units.

You might consider the possibilities of single sideband. In SSB the carrier wave is surpressed in the equipment, and all that is delivered is pure information-carrying signal. The initial cost of such equipment is higher than that of conventional AM equipment, but each watt of power delivered is doing much more work.

There are an endless variety of transmitters to choose from, and it would be a good idea to shop around for exactly what you want. The same basic rule holds as for receivers; the equipment of all reputable firms is competitively priced, the differences are in the various features offered with the equipment.

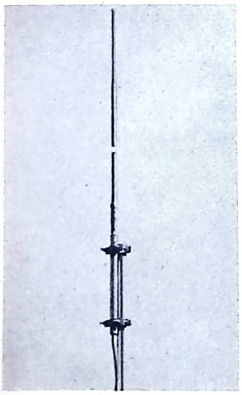
Kit Building

Buying a piece of ham equipment in kit form usually knocks anywhere from 20 to 30 per cent off the price. The kits are easy to build. The important thing to remember is to follow instructions. It would be a good idea to buy and construct a comparatively inexpensive and simple kit before you start an expensive transmitter or receiver. This will give you the experience and confidence you need.

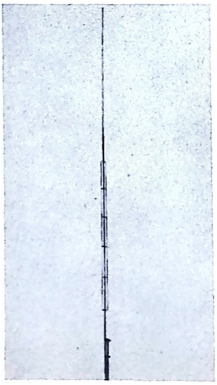
There is a chapter further on in this book on kit construction techniques; if you're interested in building your own equipment this chapter will give you all the information you need.

Antennas

Most ham operators are somewhat limited in their choice of antennas by the space they have available and the type of structure they are able to erect. There are also many tech-



MARK PRODUCTS
Mark II Antenna



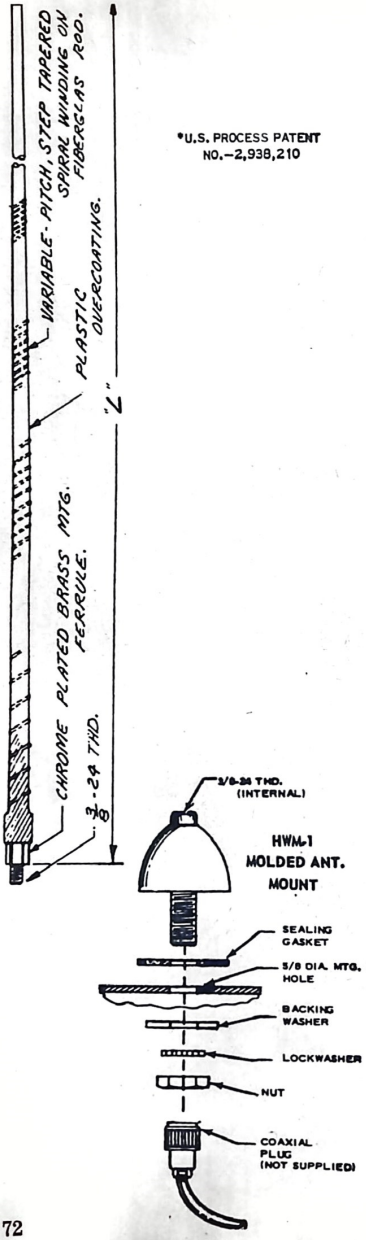
MARK PRODUCTS
Mark V Antenna

nical considerations that help determine the characteristics of the antenna you erect. To learn about ground effects, current and voltage distribution and impedance, consult the chapter on antennas in **the Radio Amateur's Handbook,** put out every year by the A.R.R.L., or **the A.R.R.L. Antenna Book;** both go more deeply into the technical aspects of antenna construction. This discussion is to give you a general idea of the problems, needs, and possibilities of ham radio antenna systems.

A good temporary antenna to use until you can erect a more permanent one consists of 85 feet of number 14 enameled wire attached to your antenna output and stretched out in as straight a line as you can manage. It would be a good idea to take it out of a window and attach the other

ABBREVIATIONS USED IN C.W.

AA	All after
AB	All before
ABT	About
ADR	Address
AGN	Again
ANT	Antenna
BCI	Broadcast interference
BK	Break (break in)
B4	Before
C	Yes
CFM	Confirm
CLD-CLG	Called, Calling
CUD	Could
CUL	See you later
CUM	Come
CW	Continuous wave
DLD-DLVD	Delivered
DX	Distance
FB	Fine business
GA	Go ahead
GB	Good-by
GBA	Give better address
GE	Good evening
GG	Going
GM	Good morning
GN	Good night
GND	Ground
GUD	Good
HI	The telegrapher's laugh: high
HR	Here; hear
HV	Have
HW	How
LID	A poor operator
MA-MILS	Milliampere(s)
MSG	Message
N	No
ND	Nothing doing
NIL	I have nothing for you
NR	Number
NW	Now; I resume transmission
OB	Old boy
OM	Old man
OP-OPR	Operator
PSE	Please
PWR	Power
RCD	Received
RPT	Repeat
SED	Said
SIG	Signature; signal
SKED	Schedule
SRI	Sorry
SVC	Service
TFC	Traffic
TMW	Tomorrow
TNX-TKS	Thanks
TXT	Text
WA	Word after
WB	Word before
WD-WDS	Word; words
WKD-WKG	Worked; working
WL	Well; will
WUD	Would
WX	Weather
XMTR-TX	Transmitter
XTAL	Crystal
YF/XYL	Wife
YL	Young lady
73	Best regards
88	Love and kisses



MARK PRODUCTS

Detail of mobile antenna

end of it to a tree, building or other support. It should be off the ground and insulated by non-conducting supports from anything holding it up.

The next step is a simple permanent antenna. The simplest is a half-wave type, cut for the frequency you want to work, and center-fed with any standard antenna transmission line. The proper length for a half wave antenna cut to the center of the various ham bands is :

Wave length (meters)	Antenna length
80	125′ 8″
40	65′ 2″
20	33′ 2″
15	22′ 1″
10	16′ 2″
5	9′ -
2	3′ 2½″

One of the most useful antennas is called the "double." This is a dipole antenna that has the two ends brought close to each other until the structure is in the shape of a V. The "inverted-V" antenna is a doublet with the center raised above the two ends. It has the advantage of requiring only one high support. Most users of inverted V antennas find that they give superior performance.

Although one of the basic factors of antenna performance is the height of the antenna, the difficulties of constructing antenna structures of fantastic heights are formidable. Sixty feet is usually considered about as

high as it's practical to go, and many hams gladly settle for 30-40 feet.

Ham band antennas can be erected straight up and down (like a car's whip) instead of parallel to the ground. They are then said to be polarized **vertically** instead of **horizontally.** The polarization refers to the direction in which the radio waves are oriented in relation to the ground. For short-distance communication (under 100 miles) the polarization is important, as antennas polarized in opposite ways will not pick up each other very well.

The length of a vertical antenna can be about half of that necessary for a horizontal antenna, as the ground (or an artificially constructed "ground plane") acts as a sort of "electronic mirror" and doubles the effective length of the antenna. At the same time, a vertical antenna is going to be troubled with ground losses and lose some of its output power by having nearby objects absorb the energy.

Running a Ham Station

One of the FCC requirements for the radio amateur is that he keep a complete and accurate log of all his transmissions. The log should contain the following information:

DATE/TIME: The date and time of each entry to the minute.

STATION CALLED: The call sign of the station you are calling (if you are the station being called, put an "X" in this box)

CALLED BY: The call sign of the station doing the calling (again, if it's you, put an "X" in this box)

HIS FREQUENCY: The dial reading of the frequency of the person in contact with you.

HIS SIGNALS RST: Your estimation of the signal you are receiving on the RST scale (explained below)

MY SIGNALS RST: His estimation of your signals on the same scale

MY FREQUENCY:

EMMISSION TYPE: The type of emmission you are using (see emmission type list)

TIME OF ENDING QSO: The time this contact ended.

This is the form of the log that the A.R.R.L. recommends. The League sells printed forms of this log for a nominal sum, or you can make your own, using a stenographer's notebook. If you wish to vary the form, the information the FCC requires is:

1. The date and time of **each** transmission.
2. A record of **all** transmissions, whether contact is made or not.
3. The input power to the last stage of the transmitter.
4. The frequency band used.
5. The time of ending each contact.

If more than one operator uses the station, the log should record the signature of the operator that takes responsibility for each session of broadcasting.

On the Air

After you have your Novice license on the wall and your receiver, transmitter and logbook on the table, you're ready to go on the air.

The first thing to do is to turn on your receiver, tune it to one of the ham bands, and listen. Before you attempt to go on the air yourself, it would be a good idea for you to familiarize yourself with the standard procedure used by radio hams.

If you are working cw, what you will hear will sound something like this: "CQ CQ CQ DE WN2AAA WN2AAA WN2AAA CQ CQ CQ DE WN2AAA WN2AAA WN2AAA CQ CQ CQ DE WN2AAA WN2AAA WN2AAA K." What this translates to

is, "This is WN2AAA, I will answer anyone who hears me." It breaks up as follows: CQ — the general radio call to anyone who is interested in answering. DE — the Latin word for "from." WN2AAA — the call sign of the person calling. K — "over."

You are free to answer this call if you wish; however, if what you hear is: "WN2ZZZ WN2ZZZ WN2ZZZ DE WN2AAA WN2AAA WN2AAA, K," you don't answer it unless your call sign happens to be WN2ZZZ.

If you decide to answer a "CQ" call, your answer would look like this: "WN2AAA WN2AAA WN2AAA DE WN2BBB WN2BBB WN2BBB AR." The AR means "wait" (I am waiting for your answer).

If you are working on voice, the procedure is much the same, except you substitute the words for the code symbols. For example, the general call given above would sound like this on voice: **"Calling CQ CQ CQ this is** WN2AAA WN2AAA WN2AAA **over."** It is standard procedure to identify the area in which your station is located when calling by voice (ie: **This is New York** WN2AAA WN2AAA WN2AAA). Letters can be said in the International Phonetic Alphabet for easier understanding when you are working voice. This will make it easier for the person with whom you're communicating to understand what you've sent as a call sign if there is any static or if your signal is weak.

To find out how well your signal is being received, request an RST report. The RST, or Readability, Strength, Tone system, gives this information on a sliding scale of one to nine. A perfect signal report would be: RST 999X, meaning "Your Readability is perfect, your Signal Strength is extremely strong, your Tone is of the purest dc signal (the "X" means that your signal has the stability of a crystal-controlled transmitter). For voice operation, only the first two, R and S, are used.

QSL

QSL, a Q-code that means "can you acknowledge receipt?" is the signal that is used to ask the people you "work" to confirm your contact by sending you a card. This card, usually a postcard, but sometimes sent in an envelope, is called a QSL card. If you request a QSL be sure to give your contact your address, as the **Radio Amateur Callbook** will take at least one issue to list your new call in its pages.

If you expect to get a QSL card, be sure to send one. It would probably be a good idea for you to send yours before you receive his; he might be waiting too.

There is no standard form for the QSL card, and its appearance is limited only by your imagination and the amount of money you feel like spending in having them printed up. The card should include the following information: the date and time of contact, the call letters of the station you worked; a signal report, frequency and mode (cw, AM voice, SSB, etc.).

Message Handling

One of the public service aspects of ham radio is passing messages—like telegrams—from one part of the world to another. The messages might be from friends or neighbors in one part of the country to the same in another, or they might be from a serviceman overseas to his family. Whatever the message, it must be

passed completely free of charge if you agree to handle it at all. There exist area-wide, state-wide and even country-wide traffic nets to handle this constant flow of messages. Most of the traffic is handled by one or more of these nets to speed it on its way to its destination.

The A.R.R.L. publishes, free of charge, the **A.R.R.L. Net Directory,** which you can get by writing to the **Amateur Radio Relay League, 225 Main Street, Newington 11, Connecticut,** if you are interested in joining one of these nets. Being a member of one is probably the best way to gain actual operating experience under a variety of conditions in a short time.

The only restriction to message handling in the United States is that the message be in good taste, and that you don't charge for the service in any way. You can not, however, take messages for a third party from most other countries; it is against their law, and thus against the International Treaty agreements that the United States has with the country.

Amateur radio has the "unwritten" approval of the land-line telephone companies for you to patch in radio signals, on a local basis, to your telephone. If you, for example, happen to be talking to a ham operator in a U.S. military installation in Germany, and you find out that his folks live right down the street from you, it is all right for you to call them up and then patch his voice into your end of the phone. Again, however, you can in no way charge for this service.

MARS

The Military Affiliate Radio System, or MARS, is a program set up by the various military services to assist both the service and the radio amateur. In becoming a member of one of the MARS programs, you will be permitted to operate on special frequencies set aside by the military for this purpose, and to handle traffic for servicemen overseas. You may also have an opportunity to pick up military equipment that has become surplus at a reduced rate.

As you pick up military procedures, you will become of value to the service as an auxiliary or emergency operator in the MARS system.

Doing this does not imply any sort of military obligation, and you can quit any time you may desire.

For information on the various MARS programs, write to:

ARMY:
Chief Army MARS
Room 5B960,
The Pentagon
Washington 25, D.C.

NAVY:
Chief Navy MARS
Room 5D564, Office of Naval Communications (OP-945N)
The Pentagon
Washington 25, D.C.

AIR FORCE:
Chief Air Force MARS
Room 1-217, Tempo "E" Building
4th and Adams Drive S.W.
Washington 25, D.C.

Canadian Amateur Radio

The Department of Transport in Canada has the functions of the FCC in the United States. Amateur licenses have the following qualifications in Canada:

1. The applicant must be 15 years old or over.
2. The applicant must be a citizen by birth or naturalization of Canada or of any other British

Commonwealth country or a landed immigrant to Canada.

3. The applicant must be physically able to operate the equipment in his proposed amateur radio station.
4. The applicant must be able to pass the required examination.

Canada has two classes of ham radio operators; Amateur and Advanced Amateur. To qualify as an amateur you must pass a code test at 10 w.p.m. and a written and oral test on amateur radio theory and regulations. If you pass the test you will receive a "Certificate of Proficiency in Amateur Radio," which will remain valid indefinitely unless you relinquish it or it is revoked. This is not a license. Before you start to operate you must have a station license. The amateur station license is good for one year, renewable each year upon payment of the $2.50 yearly license fee.

Your amateur certificate authorizes full privileges to operate cw on all amateur bands, and to operate AM (and TV by special permission) on the ham bands above 50 megacycles. After you've been operating for six months—by your station's log—you can request authorization to use AM between 28.1 and 29.7 megacycles by showing your log to a regional Radio Inspector. If he considers your experience and equipment okay, he will grant the request.

When you can show proof that you have operated for a full year you can request the Advanced Amateur examination. If you pass it you will be allowed to use voice on all the Canadian amateur phone bands.

Test Procedure

The first step in getting a Canadian amateur radio license is to make an appointment with your local DOT office to take the test. On the appointed day, bring your birth certificate or some other valid proof of age with you to the office. After you fill out the examination form and pay the 50 cent fee, you will be given tests.

First comes the Morse code test. It tests your ability to send and receive 10 w.p.m. of Morse for three minutes consecutively.

Then comes the written and oral part of the exam. If you are in a bilingual DOT office, you will be able to take this in either French or English; in an office that is not bi-lingual, it will be offered in English only. Part of the written examination is a test of your ability to draw the schematic diagrams of a simple transmitter and receiver; part of the oral exam will be questions on the diagrams or on the equipment you are planning to use in your station if they do not coincide.

You must get a grade of 75 per cent or better on the written and oral part of the examination, plus at least 50 per cent on the diagrams—which are graded separately. If you pass the test you may apply for your amateur station license immediately; if you don't pass it, you can set up a date for re-examination with the Radio Inspector. He will usually allow at least a two-month waiting period before letting you take it again.

It is against Canadian law for you to own a radio station without a valid license, so wait until you have the license before buying the equipment.

If you live in the middle of the Canadian wilderness, and it would be impossible for you to get to a DOT office to take the examination, you can apply for a provisional station license. You must fill out the amateur station license application form, and certify that, to the best of your belief, you possess the technical knowledge to operate an amateur station. The license, if granted, will be good until the next March 31. If you still haven't been able to take the test, the license can be renewed for a per-

iod of up to one year from the date of original issue. After this time the license cannot be further extended unless you take the proficiency examination.

If you are physically unable to appear at a DOT office to take the examination, write to your regional DOT office and explain; arrangements of some kind will be made for you.

U.S. Hams in Canada

With the permission of the Telecommunications Division, Department of Transport, Ottawa, Ontario, Canada, you, as a holder of a U.S. Conditional Class or higher license, may operate a fixed, mobile or portable ham station in Canada.

While in Canada you must observe the regulations that control the operation of Canadian amateur radio and, in addition, notify the Engineer-in-Charge of the radio district in which you plan to operate if it is a fixed station.

Canadian Hams in the U.S.

For permission to operate in the United States, a Canadian ham must write to: The Secretary, Federal Communications Commission, Washington 25, D.C. When such permission is obtained you may operate, obeying the regulations affecting United States amateurs.

For Further Information

If you are interested enough in any phase of amateur radio to want additional information, the following books, published by the A.R.R.L., are recommended:

HOW TO BECOME A RADIO AMATEUR
THE RADIO AMATEUR'S LICENSE MANUAL
A COURSE IN RADIO FUNDAMENTALS
THE A.R.R.L. ANTENNA BOOK
THE RADIO AMATEUR'S HANDBOOK

These will provide you with all the information you need, and answer any questions you may have about ham radio. They are available in most stores that sell amateur radio gear, or can be obtained by writing directly to the A.R.R.L.

CANADIAN RADIO AMATEUR EXAMINATION SITES

Calgary, Alberta
Inspector, Radio Regulations
411 Public Building

Edmonton, Alberta
Regional Director, Air Services
Federal Building, 9820 107th Street.

Grande Prairie, Alberta
Inspector, Radio Regulations
Room 202, Richmond Building
10118 Richmond Avenue

Kelowna, British Columbia
Inspector, Radio Regulations
434 Bernard Avenue

Prince Rupert, British Columbia
Inspector, Radio Regulations
Number 2 Wallace Block,
305 Fulton Street

Vancouver, British Columbia
Regional Director, Air Services
739 West Hastings Street

Victoria, British Columbia
Inspector, Radio Regulations
Room 404, Belmont Building
805 Government Street

Brandon, Manitoba
Inspector, Radio Regulations
Room 204 Post Office Building

Winnipeg, Manitoba
Regional Director, Air Services
Winnipeg General Post Office Building
266 Graham Avenue

Moncton, New Brunswick
Regional Director, Air Services,
Federal Building
1081 Main Street

Saint John, New Brunswick
Inspector, Radio Regulations,
Customs House
Prince William Street

St. John's, Newfoundland
Inspector, Radio Regulations
Room 632, Sir Humphrey Gilbert Building,
Duckworth Street

Halifax, Nova Scotia
Inspector, Radio Regulations,
Dominion Public Building

Sydney, Nova Scotia
Inspector, Radio Regulations
Room 251, Federal Building
Dorchester Street

Hamilton, Ontario
Inspector, Radio Regulations
Room 629, Canadian Government Building,
150 Main Street, West

London, Ontario
Inspector, Radio Regulations
Rooms 406-408 Dominion Public Building,
405 Richmond Street

Kingston, Ontario
Inspector, Radio Regulations
Room 273, Federal Building

Kitchener, Ontario
Inspector, Radio Regulations,
Dominion Public Building,
15 Duke Street

North Bay, Ontario
Inspector, Radio Regulations,
Room 408, New Federal Building,
101 Worthington Street, East

Ottawa, Ontario
Inspector, Radio Regulations
Room 405, Garland Building
142 Queen Street

Port Arthur, Ontario
Inspector, Radio Regulations
Room 330, Dominion Public Building

Sault Ste. Marie, Ontario
Inspector, Radio Regulations
Room 302 Federal Building
Queen and East Streets

Toronto, Ontario
Regional Director, Air Services,
25 St. Clair Avenue East

Dorval, Quebec
Regional Director, Air Services,
Regional Administration Building,
Montreal International Airport

Montreal, Quebec
Inspector, Radio Regulations,
Room 725, 305 Dorchester Street, West

Port Alfred, Quebec
Inspector, Radio Regulations
101 Du Pait Avenue

Quebec, Quebec
Inspector, Radio Regulations,
Public Building, 390 Dorchester Street

Sherbrooke, Quebec
Inspector, Radio Regulations,
Federal Building, 315 King Street, West

Three Rivers, Quebec
Inspector, Radio Regulations
Public Building, Post Office

Regina, Saskatchewan
Inspector, Radio Regulations,
Room 414, Post Office Building

Saskatoon, Saskatchewan
Inspector, Radio Regulations,
Room 412, Federal Building

PART 97 — AMATEUR RADIO SERVICE

Subpart A — General

§ 97.1. *Basis and Purpose.* The rules and regulations in this part are designed to provide an Amateur Radio Service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international good will.

§ 97.3. *Definitions.* (a) *Amateur Service.* A radio service carried on by amateur stations.

(b) *Amateur operator.* A person interested in radio technique solely with a personal aim and without pecuniary interest, holding a valid license issued by the Federal Communications Commission authorizing him to operate licensed amateur stations.

(c) *Amateur station.* A station used by an amateur operator, and embracing all radio transmitting apparatus at a particular location used for amateur service and operated under a single instrument of authorization.

(d) *Amateur portable station.* An amateur station that is so constructed that it may conveniently be moved about from place to place for communication, but which is not operated while in motion.

(e) *Amateur mobile station.* An amateur station that is so constructed that it may conveniently be transferred to or from a mobile unit or from one such unit to another, and is ordinarily used while such mobile unit is in motion.

(f) *Amateur radio communication.* Radio communication between amateur stations solely with a personal aim and without pecuniary interest.

(g) *Remote control.* Control of transmitting equipment of an amateur station from an operating position other than one at which the transmitter is in view and immediately accessible; except that, direct mechanical control or direct electrical control by wired connections of an amateur transmitter, from a point located on board any aircraft, vessel or vehicle on which such transmitter is located shall not be considered remote control within the meaning of this definition.

(h) *Antenna structure.* The radiating system, including its supporting structures, and any surmounting appurtenances.

(i) *Aircraft landing area.* Any locality, either on land or water, including airports and intermediate landing fields, which is used, or approved for use, for landing and take-off of aircraft whether or not facilities are provided for the shelter, servicing, or repair of aircraft, or for the receiving or discharging of passengers or cargo.

Subpart B — Amateur Operator and Station Licenses

Operator Licenses

§ 97.5. *Classes of amateur operator licenses.*

Amateur Extra Class.
Advanced Class ..... (Previously Class A)
General Class ..... (Previously Class B)
Conditional Class ..... (Previously Class C)
Technician Class.
Novice Class.

§ 97.7. *Privileges of operator licenses.*

(a) *Amateur Extra Class.* All authorized amateur privileges including such additional privileges in both communication and technical phases of the art which the Commission may consider as appropriately limited to holders of this class of license.

(b) *Advanced Class.* All amateur privileges except those which may be reserved to holders of the Amateur Extra Class license.

(c) *General and Conditional Classes.* All authorized amateur privileges.

(d) *Technician Class.* All authorized amateur privileges in the amateur frequency bands 50 to 54 Mc/s., 145 to 147 Mc/s., and in the amateur frequency bands above 220 Mc/s.

(e) *Novice Class.* Those amateur privileges as designated and limited as follows:

(1) The d.c. plate power input to the vacuum tube or tubes supplying power to the antenna shall not exceed 75 watts.

(2) Only the following frequency bands and types of emission may be used, and the emissions of the transmitter must be crystal-controlled: (i) 3700 to 3750 kc/s., radiotelegraphy using only type A1 emission. (ii) 7150 to 7200 Kc/s., radiotelegraphy using only type A1 emission. (iii) 21.10 to 21.25 Mc/s., radiotelegraphy using only type A1 emission. (iv) 145 to 147 Mc/s., radiotelegraphy or radiotelephony using types of emission as set forth in § 97.61.

§ 97.9. *Eligibility for operator license.* Per-

sons are eligible to apply for the various classes of amateur operator licenses as follows:

(a) *Amateur Extra Class.* Any citizen of the United States who either (1) at any time prior to receipt of his application by the Commission has held for a period of two years or more a valid amateur operator license issued by the Federal Communications Commission, excluding licenses of the Novice and Technician Classes, or (2) submits evidence of having held a valid amateur radio station or operator license issued by any agency of the United States Government during or prior to April, 1917.

(b) *Advanced Class.* New Advanced Class amateur operator licenses will not be issued; however, Advanced Class (or Class A) licenses may continue to be renewed as set forth in § 97.13.

(c) *General Class.* Any citizen of the United States.

(d) *Conditional Class.* Any citizen of the United States:

(1) Whose actual residence and amateur station location are more than 75 miles airline distance from the nearest location at which examinations are held at intervals of not more than 3 months for General Class amateur operator license.

(2) Who is shown by physician's certificate to be unable to appear for examination because of protracted disability.

(3) Who is shown by certificate of the commanding officer to be in the armed forces of the United States at an Army, Navy, Air Force or Coast Guard station and, for that reason, to be unable to appear for examination at the time and place designated by the Commission.

(4) Who furnishes sufficient evidence, at the time of filing, of temporary residence for a continuous period of at least 12 months outside the continental limits of the United States, its territories or possessions, irrespective of other provisions of this paragraph.

(e) *Technician Class.* Any citizen of the United States.

(f) *Novice Class.* Any citizen of the United States except a former holder of an amateur license of any class issued by any agency of the United States government, military or civilian.

§ 97.11. *Application for Operator License.*

(a) An application (FCC Form 610) for a new operator license, including an application for change in operating privileges, which will require an examination supervised by Commission personnel, shall be submitted to the district field office of the Commission which exercises jurisdiction over the area in which the applicant resides. Upon receipt of the application, and any necessary filing fee (See § 97.55), the district field office will make arrangements for conducting the required examination either at its location or at an examination point within its area.

(b) An application (FCC Form 610) for a new operator license, including an application for change in operating privileges, which requests an examination supervised by a volunteer examiner under the provisions of § 97.29(b), shall be submitted to the Commission's office at Gettysburg, Pennsylvania 17325. The application shall be accompanied by any necessary filing fee (See § 97.55) and by a request for the written examination material (See § 97.29(b)).

(c) An application (FCC Form 610) for renewal and/or modification of license when no change in operating privileges is involved shall be submitted, together with any necessary filing fee (See § 97.55), to the Commission's office at Gettysburg, Pennsylvania 17325.

§97.13. *Renewal or modification of amateur operator license.*

(a) An amateur operator license, except the Novice Class, may be renewed upon proper application in which it is stated that the applicant has lawfully accumulated, at an amateur station licensed by the Commission, a minimum total of either 2 hours operating time during the last three months or 5 hours operating time during the last 12 months of the license term. Such operating time, for the purpose of renewal, shall be counted as the total of all that time between the entries in the station log showing the beginning and end of transmissions as required in § 97.103(a), both during single transmissions and during a sequence of transmissions. The application shall, in addition to the foregoing, include a statement that the applicant can send by hand key, i.e., straight key or any other type of hand operated key such as a semi-automatic or electronic key, and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than that which is required in qualifying for an original license of the class being renewed.*

(b) The Novice Class license will not be renewed.

(c) The applicant shall qualify for a new license by examination if the requirements of this section are not fulfilled.

(d) Application for renewal and/or modification (change of address, etc.) of an amateur operator license shall be submitted on FCC Form 610 and shall be accompanied by the applicant's license. Application for renewal of unexpired licenses must be made during the license term and should be filed within 90 days but not later than 30 days prior to the end of the license term. In any case in which the licensee has, in accordance with the provisions of this chapter, made timely and sufficient ap-

plication for renewal of an unexpired license, no license with reference to any activity of a continuing nature shall expire until such application shall have been finally determined.

(e) If a license is allowed to expire, application for renewal may be made during a period of grace of one year after the expiration date. During this one year period of grace, an expired license is not valid. A license renewed during the grace period will be dated currently and will not be backdated to the date of its expiration. Application for renewal shall be submitted on FCC Form 610 and shall be accompanied by the applicant's expired license.

*Note: Until further order of the Commission, the showing that the applicant actually operated an amateur radio station or stations for the periods of time specified in § 97.13 will not be required in cases where it is shown that the applicant was unable to conduct such operation because he was on active duty overseas in the armed forces of the United States or was duly enrolled as an employee of an agency of the Federal Government and in the course of such employment was on duty in a foreign country continuously during the last year of the license term: Provided, That any such employee of the Federal Government shall submit with his application for renewal of license a statement signed by his agency head, or the chief of the Bureau or Division in which he is employed attesting to such employment.

Operator License Examinations

§ 97.19. *When examination is required.* Examination is required for the issuance of a new amateur operator license, and for a change in class of operating privileges. Credit may be given, however, for certain elements of examination as provided in § 97.25.

§ 97.21. *Examination elements.* Examinations for amateur operator privileges will comprise one or more of the following examination elements:

Element 1(A): *Beginner's code test.* Code test at five (5) words per minute.

Element 1(B): *General code test.* Code test at thirteen (13) words per minute.

Element 1(C): *Expert's code test.* Code test at twenty (20) words per minute.

Element 2: *Basic amateur practice.* Amateur radio operation and apparatus, including radiotelephone and radiotelegraph.

Element 3(A): *Basic law.* Rules and regulations essential to beginners' operation, including sufficient elementary radio theory for the understanding of those rules.

Element 3(B): *General regulations.* Provisions of treaties, statutes, and rules and regulations affecting all amateur stations and operators.

Element 4(B): *Advanced amateur practice.* Advanced radio theory and operation as applicable to modern amateur techniques, including, but not limited to, radiotelephony, radiotelegraphy, and transmissions of energy for measurements and observations applied to propagation, for the radio control of remote objects and for similar experimental purposes.

§ 97.23. *Examination requirements.* Applicants for original licenses will be required to pass examinations as follows:

(a) *Amateur Extra class.*
Elements 1(C), 2, 3(B) and 4(B).

(b) *General class.*
Elements 1(B), 2 and 3(B).

(c) *Conditional class.*
Elements 1(B), 2 and 3(B).

(d) *Technician class.*
Elements 1(A), 2 and 3(B).

(e) *Novice class.*
Elements 1(A) and 3(A).

§ 97.25. *Examination credit.* (a) An applicant for a higher class of amateur operator license who holds a valid amateur operator license issued upon the basis of an examination by the Commission will be required to pass only those elements of the higher class examination that were not included in the examination for the amateur license held when such application was filed. However, credit will not be allowed for licenses issued on the basis of an examination given under the provisions of Section 97.29(b).

(b) An applicant for any class of amateur operator license, except the Extra Class, will be given credit for the telegraph code element if within 5 years prior to the receipt of his application by the Commission he held a commercial radiotelegraph operator license or permit issued by the Federal Communications Commission.

(c) An applicant for Amateur Extra Class operator license will be given credit for examination elements 1(C) and 4(B) if he so requests and submits evidence of having held a valid amateur radio station or operator license issued by any agency of the U. S. Government during or prior to April, 1917, and qualifies for or currently holds a valid amateur operator license of the General or Advanced Class.

(d) No examination credit, except as herein provided, shall be allowed on the basis of holding or having held any amateur or commercial operator license.

§ 97.27. *Availability of Conditional Class License Examinations.* The examinations for Conditional Class will be available only under one or more of the following conditions:

(a) If the applicant's actual residence and proposed amateur station location are more than 75 miles airline distance from the nearest location at which examinations are conducted by an authorized Commission employee or representative at intervals of not more than 3 months for amateur operator licenses. (b) If the applicant is shown by physician's certificate

to be unable to appear for examination because of protracted disability. (c) If the applicant is shown by certificate of the commanding officer to be in the armed forces of the United States at an Army, Navy, Air Force, or Coast Guard station and, for that reason, to be unable to appear for examination at the time and place designated by the Commission. (d) If the applicant demonstrates by sufficient evidence that his temporary residence is for a continuous period of at least 12 months outside the continental limits of the United States, its territories or possessions, irrespective of other provisions of this section.

§ 97.29. *Manner of conducting examinations.*

(a) The examinations for Extra and General Classes of amateur operator licenses will be conducted by an authorized Commission employee or representative at locations and at times specified by the Commission.

(b) Unless otherwise prescribed by the Commission, an examination for the Conditional, Technician, or Novice Class license will be conducted and supervised by a volunteer examiner selected by the applicant. A volunteer examiner shall be at least 21 years of age and shall be the holder of an Extra, Advanced, or General Class Amateur Radio operator license, or shall hold a Commercial radiotelegraph operator license issued by the Commission, or shall be employed in the service of the United States as the operator of a manually operated radiotelegraph station. The written portion of the examination shall be obtained, supervised, and submitted in accordance with the following procedure:

(1) Within ten days after passing the required code test, an applicant shall submit an application (FCC Form 610), together with any filing fee prescribed by § 97.55, to the Commission's office at Gettysburg, Pennsylvania 17325. The application shall include a written request from the volunteer examiner for the appropriate examination papers. The examiner's written request shall include (i) the names and permanent addresses of the examiner and the applicant, (ii) a description of the examiner's qualifications to administer the examination, (iii) the examiner's statement that the applicant has passed the code test for the class of license involved under his supervision within the ten days prior to submission of the request, and (iv) the examiner's written signature. Examination papers will be forwarded only to the volunteer examiner.

Note: When the applicant is entitled to examination credit for the code test pursuant to § 97.25(b), an application may be submitted without regard to the ten day limitation. The examiner's request should then state that a code test was not administered for that reason. The applicant should furnish details as to the class, number, and expiration date of the Commercial radiotelegraph operator license involved.

(2) The volunteer examiner shall be responsible for the proper conduct and necessary supervision of the examination. Administration of the examination shall be in accordance with the instructions included with the examination papers and as prescribed in § § 97.29 (c) and (d), 97.31 and 97.33.

(3) The examination papers, either completed or unopened in the event the examination is not taken, shall be returned by the volunteer examiner to the Commission's office at Gettysburg, Pennsylvania within the time prescribed (normally not later than 20 days after the date when the papers are forwarded by the Commission).

(c) The code test required of an applicant for amateur radio operator license, in accordance with the provisions of § 97.21 and § 97.23 shall determine the applicant's ability to transmit by hand key (straight key, or if supplied by the applicant, any other type of hand operated key such as a semi-automatic or electronic key) and to receive by ear, in plain language, messages in the International Morse Code at not less than the prescribed speed, free from omission or other error for a continuous period of at least 1 minute during a test period of 5 minutes, counting five characters to the word, each numeral or punctuation mark counting as two characters.

(d) All written portions of the examinations for amateur operator privileges shall be completed by the applicant in legible handwriting or hand printing, and diagrams shall be drawn by hand, by means of either pen and ink or pencil. Whenever the applicant's signature is required, his normal signature shall be used. Applicants unable to comply with these requirements, because of physical disability, may dictate their answers to the examination questions and the receiving code test and if unable to draw required diagrams, may dictate a detailed description essentially equivalent. If the examination or any part thereof is dictated, the examiner shall certify the nature of the applicant's disability and the name and address of the person(s) taking and transcribing the applicant's dictation.

§ 97.31. *Grading of examinations.* (a) Code tests for sending and receiving are graded separately. Failure to pass the required code test for either sending or receiving will terminate the examination. (b) Seventy-four percent is the passing grade for written examinations. For the purpose of grading, all elements, other than element 4(B), required in qualifying for a particular license will be considered a single examination, and element 4(B), will be considered as a separate examination. All written examinations will be graded only by Commission personnel.

§ 97.33. *Eligibility for reexamination.* An applicant who fails examination for an amateur operator license may not take another examination for the same or a higher class amateur operator license within 30 days, except that this limitation shall not apply to an examination for a General Class license following an examination conducted by a volunteer examiner for a Novice, Technician or Conditional Class license.

§ 97.35. *Additional examinations for holders of Novice, Technician, or Conditional Class operator licenses.* (a) The Commission may require a licensee holding a Novice, Technician, or Conditional Class of operator license to appear for a Commission-supervised license examination at a location designated by the Commission. If the licensee fails to appear for this examination when directed to do so, or fails to pass such examination, the Novice, Technician, or Conditional Class operator license previously issued shall be subject to cancellation, and upon cancellation, a new license will not be issued for the same class operator license as that cancelled.

(b) Whenever the holder of a Novice, Technician, or Conditional Class amateur operator license is required by the Commission to restrict the operations of his amateur station, in accordance with the provisions of § § 97.131, 96.133, or 97.135, the necessity for such restriction shall be considered sufficient grounds to require the holder of the Novice, Technician, or Conditional Class license to appear for a Commission-supervised examination.

(c) A holder of a Conditional license obtained on the basis of an examination under the provisions of § 97.29(b) is not required to be reexamined when changing residence and station location to within a regular examination area, nor when a new examination location is established within 75 miles of such licensee's residence and station location.

Station Licenses

§ 97.37. *General eligibility for station license.* A license for an amateur station will be issued in response to proper application therefor to a licensed amateur operator who has made a satisfactory showing of control of the transmitting station for which license is desired and of control of the specific premises upon which all of the station apparatus is to be located, at a designated fixed location. An amateur station license may also be issued to an individual, not a licensed amateur operator (other than an alien or a representative of an alien or of a foreign government), who is in charge of a proposed amateur station for recreation under military auspices (only of the Armed Forces of the United States) which is to be located in approved public quarters but not operated by the United States Government.

§ 97.39. *Eligibility of corporations or organizations to hold station license.* An amateur station license will not be issued to a school, company, corporation, association, or other organization, nor for its use except that in the case of a bona fide amateur radio organization or society a station license may be issued to a licensed amateur operator, other than the holder of a Novice Class license, as trustee for such society.

§ 97.41. *Application for station license.* (a) Each application shall be made in writing on FCC Form 610.

(b) One application and all papers incorporated therein and made a part thereof shall be submitted for each amateur station license. If the application is for station license only, it shall be filed directly with the Commission at its Gettysburg, Pa., office. If the application also contains application for any class of amateur operator license, it shall be filed in accordance with the provisions of § 97.11.

§ 97.43. *Location of Station.* (a) Every amateur station shall have a fixed transmitter location. Only one fixed transmitter location will be authorized and will be designated on the license for each amateur station, except that when remote control is authorized, the location of the remote control position as well as the location of the remotely controlled transmitter shall be considered as fixed transmitter locations and will be so designated on the station license. Unless remote control of the transmitting apparatus is authorized, such apparatus shall be operated only by a duly licensed amateur radio operator present at the location of such apparatus.

(b) Authority for operation of an amateur station with the licensed operator on duty at a specific remote control point in lieu of the remote transmitter location may be granted upon filing an application for a modified station license on FCC Form 610, provided that the following conditions are met: (1) The remote control point as well as the remotely controlled transmitter, shall be located on premises controlled by the licensee. (2) The remotely controlled transmitter shall be so installed and protected that it is inaccessible to other than duly authorized persons. (3) In addition to the requirements of § 97.85 a photocopy of the amateur station license shall be posted in a conspicuous place at the location of the remotely controlled transmitter. (4) Means shall be provided at the control point to permit the continuous monitoring of the emissions of the remotely controlled transmitter, and it shall be continuously monitored when in operation. (5) Means shall be provided at the remote control point immediately to suspend the radiation of the transmitter when there is any deviation from the terms of the

station license or from the Amateur Radio Service rules. (6) In the event that operation of an amateur transmitter from a remote control point by radio is desired, an application for a modified station license on FCC Form 610 should be submitted with a letter requesting authority to operate in such a manner stating that the controlling transmitter at the remote control location will operate within amateur frequency bands 220 megacycles or higher and that there will be full compliance with subparagraphs (1) through (5) of this paragraph. Supplemental statements and diagrams should accompany the application and show how radio remote control will be accomplished and what means will be employed to prevent unauthorized operation of the transmitter by signals other than those from the controlling unit. There should be included complete data on control channels, relays and functions of each, directional antenna design for the transmitter and receiver in the control circuit, and means employed for turning the main transmitter on and off from the remote control location.

(c) An amateur transmitter may be operated from a remote control point in lieu of the remote transmitter location without special authorization by the Commission when there is direct mechanical control or direct electrical control by wired connections of the transmitter from a point located in the same or closely adjoining building or structure provided there is full compliance with the conditions set forth in paragraph (b)(1) through (5) of this section.

§ 97.45. *Limitation on antenna structures.* (a) No new antenna structure shall be erected for use by any station in the Amateur Radio Service, and no change shall be made in any existing antenna structure used or intended to be used by any station in the Amateur Radio Service so as to increase its over-all height above ground level, without prior approval by the Commission, in any case when either (1) the antenna structure proposed to be erected will exceed an over-all height of 170 feet above ground level, except where the antenna is mounted on an existing man-made structure other than an antenna structure and does not increase the over-all height of such man-made structure by more than 20 feet, or (2) the antenna structure proposed to be erected will exceed an over-all height of one foot above the established airport (landing area) elevation for each 200 feet of distance, or fraction thereof, from the nearest boundary of such landing area, except where the antenna does not exceed 20 feet above the ground or if the antenna is mounted on an existing man-made structure other than an antenna structure or natural formation and does not increase the over-all height of such man-made structure or natural formation by more than 20 feet as a result of such mounting. Application for Commission approval, when such approval is required, shall be submitted on FCC Form 401-A (revised), in triplicate.

(b) In cases where FCC Form 401-A (revised) is required to be filed, further details as to whether an aeronautical study and/or obstruction marking may be required, and specifications for obstruction marking when required, may be obtained from Part 17 of this chapter, "Construction, Marking, and Lighting of Antenna Structures." Information regarding requirements as to inspection of obstruction marking, recording of information regarding such inspection, and maintenance of antenna structures is also contained in Part 17 of this chapter.

§ 97.47. *Renewal and/or modification of amateur station license.* (a) Application for renewal and/or modification (change of address, etc.) of any station license shall be submitted on FCC Form 610. In every case the application shall be accompanied by the applicant's license. Applications for renewal of unexpired licenses must be made during the license term and should be filed within 90 days but not later than 30 days prior to the end of the license term. In any case in which the licensee has, in accordance with the provisions of this chapter, made timely and sufficient application for renewal of an unexpired license, no license with reference to any activity of a continuing nature shall expire until such application shall have been finally determined.

(b) If a license is allowed to expire, application for renewal may be made during a period of grace of one year after the expiration date. During this one year period of grace, an expired license is not valid. A license renewed during the grace period will be dated currently and will not be backdated to the date of expiration. Applications shall be submitted on FCC Form 610 and shall be accompanied by the applicant's expired license.

§ 97.49. *Commission modification of station license.* (a) Whenever the Commission shall determine that public interest, convenience, and necessity would be served, or any treaty ratified by the United States will be more fully complied with, by the modification of any radio station license either for a limited time, or for the duration of the term thereof, it shall issue an order for such licensee to show cause why such license should not be modified.

(b) Such order to show cause shall contain a statement of the grounds and reasons for such proposed modification, and shall specify wherein the said license is required to be modified. It shall require the licensee against whom it is directed to appear at a place and time therein named, in no event to be less than 30 days from the date of receipt of the order to

show cause why the proposed modification should not be made and the order of modification issued.

(c) If the licensee against whom the order to show cause is directed does not appear at the time and place provided in said order, a final order of modification shall issue forthwith.

CALL SIGNS

§ 97.51. *Assignment of call signs.* (a) The call signs of amateur stations will be assigned systematically by the Commission with the following exceptions: (1) A specific unassigned call sign may be reassigned to the most recent holder thereof; (2) A specific unassigned call sign may be assigned to a previous holder if not under license during the past 5 years; (3) A specific unassigned call sign may be assigned to an amateur organization in memoriam to a deceased member and former holder thereof; (4) A specific call sign may be temporarily assigned to a station connected with an event, or events, of general public interest; (5) An unassigned "two-letter call sign" (a call sign having two letters following the numeral) may be assigned to a previous holder of a two-letter call sign the prefix of which consisted of not more than a single letter.

(b) An amateur call sign will consist of a sequence of one or two letters, a numeral designating the call sign area, and two or three letters. The call sign areas are as follows:

1. Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.
2. New York, New Jersey.
3. Pennsylvania, Delaware, Maryland, District of Columbia.
4. Virginia, North and South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, Puerto Rico and Virgin Islands.
5. Mississippi, Louisiana, Arkansas, Oklahoma, Texas, New Mexico.
6. California, Hawaii and Pacific possessions except those included in area 7.
7. Oregon, Washington, Idaho, Montana, Wyoming, Arizona, Nevada, Utah, Alaska and adjacent islands.
8. Michigan, Ohio, West Virginia.
9. Wisconsin, Illinois, Indiana.
0. Colorado, Nebraska, North and South Dakota, Kansas, Minnesota, Iowa, Missouri.

FEES

§ 97.53 *Payment of fees.*

(a) Each formal application for which a fee is prescribed in § 97.55 must be accompanied by a remittance in the full amount of the fee. In no case will an application for which a fee is prescribed be accepted for filing or processed prior to payment of the full amount specified. Applications for which no remittance is received, or for which an insufficient amount is received, may be returned to the applicant.

(b) Fee payments accompanying applications submitted to the Commission should be in the form of a check or money order payable to the Federal Communications Commission. The Commission will not be responsible for cash sent through the mails. All fees collected will be paid into the United States Treasury as miscellaneous receipts in accordance with the provisions of Title V of the Independent Offices Appropriation Act of 1952 (5 U.S.C. 140).

(c) Receipts will be furnished upon request in the case of payments made in person, but no receipts will be issued for payments sent through the mails.

(d) All fees will be charged irrespective of the Commission's disposition of the application. Applications returned to applicants for additional information or corrections will not require an additional fee when resubmitted. Refunds will be made only in the case of payments in excess of the fee prescribed in this subpart.

§ 97.55 *Schedule of fees.*

(a) Except as provided in paragraph (b) of this section, applications filed on or after January 1, 1964, under this part must be accompanied by the fees prescribed below:

Applications for initial license, including new class of operator license, and applications for renewal of license	$4
Applications for modification of license without renewal	2
Applications for a combination of modification and renewal of license	4
Application for a specific call sign pursuant to § 97.51(a)	20

(Note: Reassignment of a specific call sign held under an expired license is not subject to the $20 fee if an application for renewal is filed within 1 year after the expiration date of the license.)

(b) Fees are not required for the following types of amateur applications:

Applications for Novice license.

Applications for a license for a station for recreation under military auspices.

Applications filed in the Radio Amateur Civil Emergency Service.

Informal applications for special temporary authority.

DUPLICATE LICENSES AND LICENSE TERM

§ 97.57. *Duplicate license.* Any licensee requesting a duplicate license to replace an original which has been lost, mutilated, or destroyed shall submit a statement setting forth the facts regarding the manner in which the original license was lost, mutilated, or destroyed. If, subsequent to receipt by the licensee of the duplicate license, the original license is found, either the duplicate or the original license shall be returned immediately to the Commission.

§ 97.59. *License term.* (a) Amateur operator licenses are normally valid for a period of 5 years from the date of issuance of a new or renewed license, except the Novice Class which is normally valid for a period of 1 year from the date of issuance.

(b) *License Period.* The license for an amateur station is normally valid for a period of 5 years from the date of issuance of a new or renewed license, except that an amateur station license issued to the holder of a Novice Class amateur operator license is normally valid for a period of 1 year from the date of issuance.

(c) A duplicate license or a modified license which is not being renewed shall bear the same expiration date as the license for which it is a modification or duplicate.

Subpart C — Technical Standards

§ 97.61. *Authorized frequencies and types of emissions.*

(a) Subject to the limitations and restrictions set forth in paragraph (b) of this section and in § 97.65, the following frequency bands and types of emissions are allocated and available for amateur station operation:

Band	Emission(s)	Limitations
kc/s		
1800 to 2000	A1, A3	1, 2, 3, 4
3500 to 4000	A1, A3, F1, F3	5
7000 to 7300	A1, A3, F1, F3	6
14000 to 14350	A1, A3, F1, F3	7
Mc/s		
21.0 to 21.45	A1, A3, F1, F3	8
28.0 to 29.7	A1, A3, F1, F3	9
50.0 to 54.0	A0, A1, A2, A3, A4, F0, F1, F2, F3	10
144 to 148	A0, A1, A2, A3, A4, F0, F1, F2, F3	11
220 to 225	A0, A1, A2, A3, A4, F0, F1, F2, F3, F4	12, 13
420 to 450	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5.	12, 14
1215 to 1300	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5.	12
2300 to 2450	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5, P.	12, 15
3300 to 3500	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5, P.	12
5650 to 5925	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5, P.	12, 15
10000 to 10500	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5.	12
21000 to 22000	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5, P.	
Above 40000	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5, P.	

EDITOR'S NOTE: The types of emission referred to in the amateur rules are as follows:

Type A0—Steady, unmodulated, pure carrier.
Type A1—Telegraphy on pure continuous waves.
Type A2—Amplitude tone-modulated telegraphy.
Type A3—Amplitude-modulated telephony.
Type A4—Facsimile.
Type A5—Television.
Type F0—Steady, unmodulated pure carrier.
Type F1—Carrier-shift telegraphy.
Type F2—Audio frequency-shift telegraphy.
Type F3—Frequency- or phase-modulated telephony.
Type F4—F.M. facsimile.
Type F5—F.M. television.
Type P —Pulse emissions.

(b) Explanation of the limitations appearing in the frequency tabulation of paragraph (a) of this section:

(1) Use of this band is on a shared basis with the Loran-A system of radionavigation. The amateur service may use, in any area, whichever bands, 1800–1825, 1875–1900 or 1900–1925, 1975–2000 kc/s, are not required for Loran-A in that area. The use of these frequencies by the amateur service shall not be a bar to the expansion of the radionavigation (Loran-A) service;

(2) The use of these frequencies by stations in the amateur service shall not cause harmful interference to the Loran-A system of radionavigation. If an amateur station causes such interference, the station licensee shall, as directed by the Commission, immediately cease operation on the frequencies involved.

(3) Amateur operation shall be limited to:

Area	Maximum d.c. plate input power in watts							
	1800-1825 kc/s		1875-1900 kc/s		1900-1925 kc/s		1975-2000 kc/s	
	Day	Night	Day	Night	Day	Night	Day	Night
Alabama	200	50	No operation		No operation		100	25
Alaska	200	50	200	50	No operation		No operation	
Arizona	100	25	100	25	100	25	500	100
Arkansas	200	50	No operation		No operation		200	50
California	No operation		No operation		200	50	500	200
Colorado	200	50	100	25	100	25	500	100
Connecticut	200	50	100	25	No operation		No operation	
Delaware	200	50	100	25	No operation		No operation	
District of Columbia	200	50	100	25	No operation		No operation	
Florida	100	25	No operation		No operation		No operation	
Georgia	100	25	No operation		No operation		No operation	
Hawaii	No operation		No operation		100	25	100	25
Idaho	100	25	200	50	200	50	500	100
Illinois	200	50	100	25	100	25	200	50
Indiana	200	50	100	25	100	25	100	25
Iowa	500	100	100	25	100	25	200	50
Kansas	500	100	100	25	100	25	200	50
Kentucky	200	50	100	25	100	25	100	25
Louisiana	200	50	No operation		No operation		100	25
Maine	500	100	100	25	No operation		No operation	
Maryland	200	50	100	25	No operation		No operation	
Massachusetts	500	100	100	25	No operation		No operation	
Michigan—Upper Peninsula	500	100	100	25	100	25	200	50
Michigan—Lower Peninsula	500	100	100	25	100	25	100	25
Minnesota	500	100	100	25	100	25	200	50
Mississippi	200	50	No operation		No operation		100	25
Missouri	200	50	100	25	100	25	200	50
Montana—West of 111° W	100	25	200	50	200	50	500	100
Montana—East of 111° W	200	50	200	50	200	50	500	100
Nebraska	500	100	100	25	100	25	500	100
Nevada	100	25	200	50	200	50	500	200

New Hampshire	500	100	100	25	No operation		No operation	
New Jersey	200	50	100	25	No operation		No operation	
New Mexico	200	50	100	25	100	25	500	100
New York — North of 42° N	500	100	100	25	No operation		No operation	
New York — South of 42° N	200	50	100	25	No operation		No operation	
North Carolina	200	50	No operation		No operation		No operation	
North Dakota	500	100	200	50	200	50	500	100
Ohio	200	50	100	25	100	25	100	25
Oklahoma	500	100	No operation		No operation		200	50
Oregon	No operation		No operation		200	50	500	100
Pennsylvania	200	50	100	25	No operation		No operation	
Rhode Island	200	50	100	25	No operation		No operation	
South Carolina	100	25	No operation		No operation		No operation	
South Dakota	500	100	100	25	100	25	500	100
Tennessee	200	50	No operation		No operation		100	25
Texas — East of 103° W	500	100	No operation		No operation		200	50
Texas — West of 103° W	200	50	100	25	100	25	500	100
Utah	100	25	100	25	100	25	500	100
Vermont	500	100	100	25	No operation		No operation	
Virginia	200	50	100	25	No operation		No operation	
Washington	No operation		No operation		200	50	500	100
West Virginia	200	50	100	25	No operation		No operation	
Wisconsin	500	100	100	25	100	25	200	50
Wyoming	200	50	100	25	100	25	500	100
Puerto Rico	No operation		No operation		100	25	100	25
Virgin Islands	No operation		No operation		100	25	100	25
Swan Island	500	100	No operation		No operation		100	25
Serrana Bank	500	100	No operation		No operation		100	25
Roncador Key	500	100	No operation		No operation		100	25
Navassa Island	No operation		No operation		No operation		100	25
Baker, Canton, Enderbury, Guam, Howland, Jarvis, Johnson, Midway & Palmyra Islands	No operation		No operation		500	100	500	100
American Samoa	500	200	500	200	500	200	500	200
Wake Island	500	100	500	100	No operation		No operation	

(4) Subparagraphs (1), (2), and (3) of this paragraph shall be considered as temporary in the sense that they shall remain subject to cancellation or to revision, in whole or in part, by order of the Commission without hearing whenever the Commission shall deem such cancellation or revision to be necessary or desirable in the light of the priority within this band of the Loran-A system of radionavigation.

(5) 3500 to 4000 kc/s, type A1 emission; 3500 to 3800 kc/s, type F1 emission; 3800 to 4000 kc/s, type A3 emission and narrow band frequency or phase modulation for radiotelephony; except that frequencies 3900 to 4000 kc/s are not available to stations located within following United States possessions in Region 3, as defined in the Geneva, 1959 Radio Regulations: Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa, and Wake Islands.

(6) 7000 to 7300 kc/s, type A1 emission; 7000 to 7200 kc/s, type F1 emission; 7200 to 7300 kc/s, type A3 emission or narrow band frequency or phase modulation for radiotelephony.

(7) 14,000 to 14,350 kc/s, type A1 emission; 14,000 to 14,200 kc/s, type F1 emission; 14,200 to 14,350 kc/s, type A3 emission or narrow band frequency or phase modulation for radiotelephony.

(8) 21.00 to 21.45 Mc/s, type A1 emission;

21.00 to 21.25 Mc/s, type F1 emission; 21.25 to 21.45 Mc/s, type A3 emission and narrow band frequency or phase modulation for telephony.

(9) 28.0 to 29.7 Mc/s, type A1 emission; 28.5 to 29.7 Mc/s, type A3 emission and narrow band frequency or phase modulation for radiotelephony and, on frequencies 29.0 to 29.7 Mc/s, special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).

(10) 50.0 to 54.0 Mc/s, type A1 emission; 50.1 to 54.0 Mc/s, type A2, A3, A4, and narrow band F1, F2 and F3 emissions; 51.0 to 54.0 Mc/s, type A0 emission; 52.5 to 54.0 Mc/s, type F0, F1, F2, and F3 emission.

(11) 144.0 to 148.0 Mc/s, type A1 emission; 144.0 to 147.9 Mc/s, type A0, A2, A3, A4, F0, F1, F2, and F3 emission..

(12) In this band the amateur service shall not cause harmful interference to the government radio location service.

(13) In those portions of the States of Texas and New Mexico in the area bounded on the south by parallel 31°53′ N., on the east by longitude 105°40′ W., on the north by parallel 33°24′ N., and on the west by longitude 106°40′ W., the frequency band 220–225 Mc/s is not available for use by amateur stations engaged in normal amateur operation between the hours of 0500 and 1800 local time Monday through Friday inclusive of each week. However, the entire frequency band 220–225 Mc/s shall be available in all areas to those amateur stations authorized to operate in an organized civil defense network during all periods when civil defense emergencies exist and, in addition, special arrangements for civil defense drills between the hours and within the area set forth in this sub-paragraph may be made upon mutual agreement between the Federal Communications Commission Engineer in Charge at Dallas, Texas, and the Area Frequency Coordinator at White Sands, New Mexico, if it appears necessary to conduct such drills. Such arrangements shall specify dates and times, and will depend upon the degree of use of the frequency band at White Sands at any particular time.

(14) Within the following areas, the DC plate power input to the final stage of the transmitter shall not exceed 50 watts, unless expressly authorized by the Commission after mutual agreement, on a case-by-case basis, between the Federal Communications Commission Engineer in Charge at the applicable District Office and the Military Area Frequency Coordinator at the applicable military base.

(i) Those portions of Texas and New Mexico bounded on the south by latitude 31°53′ North, on the east by longitude 105°40′ West, on the north by latitude 33°34′ North, and on the west by longitude 106°40′ West;

(ii)The entire State of Florida, including the Key West area and the areas enclosed within a 200-mile radius of Patrick Air Force Base, Florida (latitude 28°21′ North, longitude 80°43′ West), and within a 200-mile radius of Eglin Air Force Base, Florida (latitude 30°30′ North, longitude 86°30′ West);

(iii) The entire State of Arizona;

(iv) Those portions of California and Nevada south of latitude 37°10′ North, and the areas enclosed within a 200-mile radius of the U. S. Naval Missile Center, Point Mugu, California (latitude 34°09′ North, longitude 119°11′ West).

(15) Operations in the frequency bands 2300 to 2450 Mc/s and 5650 to 5925 Mc/s are subject to such interference between 2400 and 2450 Mc/s and between 5775 and 5925 Mc/s, respectively, as may result from emissions of industrial, scientific and medical devices on the frequencies 2450 and 5800 Mc/s, respectively.

§ 97.63. *Individual frequency not specified.* Transmissions by an amateur station may be on any frequency within any authorized amateur band. Sideband frequencies resulting from keying or modulating a carrier wave shall be confined within the authorized amateur band.

§ 97.65. *Special emmision limitations.* (a) Type A0 emission, where not specifically designated in the bands listed in § 97.61, may be used for short periods of time when required for authorized remote control purposes or for experimental purposes. However, these limitations do not apply where type A0 emission is specifically designated.

(b) Whenever code practice, in accordance with Section 97.91 (d), is conducted in bands authorized for A3 emission, tone modulation of the radiotelephone transmitter may be utilized when interspersed with appropriate voice instructions.

(c) The use of narrow band frequency or phase modulation is subject to the conditions that the bandwidth of the modulation carrier shall not exceed the bandwidth occupied by an amplitude-modulated carrier of the same audio characteristics, and that the purity and stability of such emissions shall be maintained in accordance with the requirements of § 97.73.

§ 97.67. *Maximum authorized power.* Except for power restrictions as set forth in § 97.61, each amateur transmitter may be operated with a power input not exceeding 1 kilowatt to the plate circuit of the final amplifier stage of an amplifier-oscillator transmitter or to the plate circuit of an oscillator transmitter. An amateur transmitter operating with a power input exceeding 900 watts to the plate circuit shall provide means for accurately measuring the plate power input to the vacuum tube or tubes supplying power to the antenna.

§ 97.69. *Radio teleprinter transmissions.* The following special conditions shall be observed during the transmission of radio teleprinter signals on authorized frequencies by amateur stations:

(a) A single channel five-unit (star-stop) teleprinter code shall be used which shall correspond to the International Telegraphic Alphabet No. 2 with respect to all letters and numerals (including the slant sign or fraction bar) but special signals may be employed for the remote control of receiving printers, or for other purposes, in "figures" positions not utilized for numerals. In general, this code shall conform as nearly as possible to the teleprinter code or codes in common commercial usage in the United States.

(b) The nominal transmitting speed of the radio teleprinter signal keying equipment shall be adjusted as nearly as possible to the standard speed of 60 words per minute and, in any event, within the range 55 to 65 words per minute.

(c) When frequency shift keying (type F1 emission) is utilized, the deviation in frequency from the mark signal to the space signal, or from the space signal to the mark signal, shall be less than 900 cycles per second.

(d) When audio frequency-shift keying (type A2 or type F2 emission) is utilized, the highest fundamental modulating audio frequency shall not exceed 3000 cycles per second, and the difference between the modulating audio frequency for the mark signal and that for the space signal shall be less than 900 cycles per second.

§ 97.71. *Transmitter power supply.* The licensee of an amateur station using frequencies below 144 megacycles shall use adequately filtered direct-current plate power supply for the transmitting equipment to minimize modulation from this source.

§ 97.73. *Purity and stability of emissions.* Spurious radiation from an amateur station being operated with a carrier frequency below 144 megacycles shall be reduced or eliminated in accordance with good engineering practice. This spurious radiation shall not be of sufficient intensity to cause interference in receiving equipment of good engineering design including adequate selectivity characteristics, which is tuned to a frequency or frequencies outside the frequency band of emission normally required for the type of emission being employed by the amateur station. In the case of A3 emission, the amateur transmitter shall not be modulated to the extent that interfering spurious radiation occurs, and in no case shall the emitted carrier wave be amplitude-modulated in excess of 100 per cent. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capability for proper technical operation. For the purposes of this section a spurious radiation is any radiation from a transmitter which is outside the frequency band of emission normal for the type of transmission employed, including any component whose frequency is an integral multiple or submultiple of the carrier frequency (harmonics and subharmonics), spurious modulation products, key clicks and other transient effects and parasitic oscillations. When using amplitude modulation on frequencies below 144 megacycles simultaneous frequency modulation is not permitted and when using frequency modulation on frequencies below 144 megacycles simultaneous amplitude modulation is not permitted. The frequency of the emitted carrier wave shall be as constant as the state of the art permits.

§ 97.75. *Frequency measurement and regular check.* The licensee of an amateur station shall provide for measurement of the emitted carrier frequency or frequencies and shall establish procedure for making such measurement regularly. The measurement of the emitted carrier frequency or frequencies shall be made by means independent of the means used to control the radio frequency or frequencies generated by the transmitting apparatus and shall be of sufficient accuracy to assure operation within the amateur frequency band used.

Subpart D — Operating Requirements And Procedures

GENERAL

§ 97.77. *Practice to be observed by all licensees.* In all respects not specifically covered by these regulations each amateur station shall be operated in accordance with good engineering and good amateur practice.

§ 97.79. *Who may operate an amateur station.* An amateur radio station may be operated only by a person holding a valid amateur operator license. Such station may be operated by the licensee only in the manner and to the extent provided in his amateur operator license. Persons other than the station licensee, when operating such station, may operate it only to the extent and in the manner authorized to the licensee of the station and not exceeding the operating authority of such person's own amateur operator license. When an amateur station is used for telephony or radio teleprinter transmissions, the station licensee may permit any person to transmit by voice or teleprinter, provided during such transmission call signs are announced or transmitted as prescribed by § 97.87 and a duly licensed amateur operator maintains actual control over the emissions, including turning the carrier on and off for each transmission and signing the station off after communication with each station has been completed.

§ 97.81. *Authorized apparatus.* An amateur

station license authorizes the use under control of the licensee of all transmitting apparatus at the fixed location specified in the station license which is operated on any frequency or frequencies allocated to the amateur service, and in addition authorizes the use, under control of the licensee, of portable and mobile transmitting apparatus operated at other locations.

§ 97.83. *Availability of operator license.* The original operator license of each operator shall be kept in the personal possession of the operator while operating an amateur station. When operating an amateur station at a fixed location, however, the license may be posted in a conspicuous place in the room occupied by the operator. The license shall be available for inspection by any authorized Government official whenever the operator is operating an amateur station and at other times upon request made by an authorized representative of the Commission, except when such license has been filed with application for modification or renewal thereof, or has been mutilated, lost, or destroyed, and request has been made for a duplicate license in accordance with § 97.57. No recognition shall be accorded to any photocopy of an operator license; however, nothing in this section shall be construed to prohibit the photocopying for other purposes of any amateur radio operator license.

§ 97.85. *Availability of station license.* The original license of each amateur station or a photocopy thereof shall be posted in a conspicuous place in the room occupied by the licensed operator while the station is being operated at a fixed location or shall be kept in his personal possession. When the station is operated at other than a fixed location, the original station license or a photocopy thereof shall be kept in the personal possession of the station licensee (or a licensed representative) who shall be present at the station while it is being operated as a portable or mobile station. The original station license shall be available for inspection by any authorized Government official at all times while the station is being operated and at other times upon request made by an authorized representative of the Commission, except when such license has been filed with application for modification or renewal thereof or has been mutilated, lost, or destroyed, and request has been made for a duplicate license in accordance with § 97.57.

§ 97.87. *Transmission of call signs.*

(a) (1) The operator of an amateur station shall transmit the call sign of the station or stations (or may transmit the generally accepted identification of the network) being called or communicated with, or shall identify appropriately any other purpose of a transmission, followed by the authorized call sign of the station transmitting:

(i) at the beginning and end of each single transmission or;

(ii) at the beginning and end of a series of transmissions between stations having established communications, each transmission of which is of less than three minutes duration (the identification at the end of such a series may be omitted when the duration of the entire series is less than three minutes), and;

(iii) at least once every ten minutes or as soon thereafter as possible during a series of transmissions between stations having established communications, and;

(iv) at least once every ten minutes during any single transmission of more than ten minutes duration.

(2) The required identification shall be transmitted on the frequency or frequencies being employed at the time and, in accordance with the type of emission authorized thereon, shall be by either telegraphy using the International Morse Code, or telephony. In addition to the foregoing, when a method of communication other than telephony or telegraphy using the International Morse Code is being used or attempted, the prescribed identification shall also be transmitted by that method.

(b) In addition to complying with the requirements of paragraph (a) of this section, an operator of an amateur station operated as a portable or mobile station using radiotelegraphy shall transmit immediately after the call sign of such station, the fraction-bar character (DN) followed by the number of the amateur call sign area in which the portable or mobile amateur station is then being operated, as for example:

Example 1.—Portable or mobile amateur station operating in the third amateur call sign area calls a fixed amateur station: W1ABC W1ABC W1ABC DE W2DEF DN 3 W2DEF DN 3 W2DEF DN 3 AR.

Example 2.—Fixed amateur station answers the portable or mobile amateur station: W2DEF W2DEF W2DEF DE W1ABC K.

Example 3.—Portable or mobile amateur station calls a portable or mobile amateur station: W3GHI W3GHI W3GHI DE W4JKL DN 4 W4JKL DN 4 W4JKL DN 4 AR.

When telephony is used, the call sign of the station shall be preceded by the words "this is" or the word "from" instead of the letters "de," followed by an announcement of the geographical location in which the portable or mobile station is being operated.

Example 4.—Portable or mobile amateur radio telephone station operating in the third call area calls a fixed amateur station: W1ABC W1ABC W1ABC "this is" or the word "from" W2DEF W2DEF W2DEF operating portable

(or mobile) 3 miles north of Bethesda, Md., over.

(c) When telephony is used, the transmission of call signs prescribed by paragraphs (a) and (b) of this section may be made by the person transmitting by voice in lieu of a duly licensed operator provided the licensed operator maintains the control required by § 97.79.

(d) When using telephony, phonetic aids to identify the call sign of the station may be employed.

(e) In addition to complying with the requirements of paragraph (a) of this section, an operator of an amateur station operated as a mobile station aboard a vessel on the high seas, or aboard an aircraft en route on an international flight, shall, when the vessel or aircraft is outside the 10 call sign areas prescribed by the Commission in § 97.51 (b), comply with the following calling procedure:

(1) Mobile operations aboard a vessel.

(i) When using telegraphy the amateur operator shall transmit immediately after the call sign of the station the fraction bar $\overline{DN}$ followed by the designator MM to indicate that the station is being operated as a mobile station aboard a vessel. In addition, the name of the vessel and its approximate geographical location shall be transmitted at the end of each transmission immediately prior to signing off. If the vessel does not have a name, the number of the vessel shall be transmitted in lieu of the name of the vessel.

(ii) When using telephony the call sign of the station shall be preceded by the words "this is," or the word "from" followed by the words "maritime mobile," to indicate that the station is being operated as a mobile station aboard a vessel. In addition the name of the vessel and its approximate geographical location shall be transmitted at the end of each transmission immediately prior to signing off. If the vessel does not have a name, the number of the vessel shall be transmitted in lieu of the name of the vessel.

(2) Mobile operations aboard aircraft.

(i) When using telegraphy the amateur operator shall transmit immediately after the call sign of the station the fraction bar $\overline{DN}$ followed by the designator AM to indicate that the station is being operated as a mobile station aboard an aircraft. In addition, the number of the aircraft and its approximate geographical location shall be transmitted at the end of each transmission immediately prior to signing off.

(ii) When using telephony the call sign of the station shall be preceded by the words "this is," or the word "from" followed by the words "aeronautical mobile," to indicate that the station is being operated as a mobile station aboard an aircraft. In addition, the number of the aircraft and its approximate geographical location shall be transmitted at the end of each transmission immediately prior to signing off.

§ 97.89. *Points of communications.* An amateur station may be used to communicate only with other amateur stations, except that in emergencies or for test purposes it may also be used temporarily for communication with other classes of stations licensed by the Commission, and with United States Government stations. Amateur stations may also be used to communicate with any radio station other than amateur which is authorized by the Commission to communicate with amateur stations. Amateur stations may be used also for transmitting signals, or communications, or energy, to receiving apparatus for the measurement of emissions, temporary observation of transmission phenomena, radio control of remote objects, and for similar experimental purposes and for the purposes set forth in § 97.91.

§ 97.91.* *One-way communications.* In addition to the experimental one-way transmissions permitted by § 97.89, the following kinds of one-way communications, addressed to amateur stations, are authorized and will not be construed as broadcasting:

*EDITOR'S NOTE: Adequately qualified amateurs interested in undertaking, purely as an amateur activity, special technical investigations, such as observation and measurement of propagation phenomena, may apply for special temporary authority to employ types of emission other than those provided for in § 97.61. Requests for such authority should include full details and should be addressed to the Secretary, Federal Communications Commission, Washington, D. C. 20554.

(a) Emergency communications, including bona-fide emergency drill practice transmissions;

(b) Information bulletins consisting solely of subject matter having direct interest to the amateur radio service as such;

(c) Round-table discussions or net-type operations where more than two amateur stations are in communication, each station taking a turn at transmitting to other station(s) of the group; and

(d) Code practice transmissions intended for persons learning or improving proficiency in the International Morse Code.

§ 97.93. *Modulation of carrier.* Except for brief tests or adjustments, an amateur radiotelephone station shall not emit a carrier wave on frequencies below 51 megacycles unless modulated for the purpose of communication. Single audio-frequency tones may be transmitted for test purposes of short duration for

the development and perfection of amateur radiotelephone equipment.

STATION OPERATION AWAY FROM AUTHORIZED LOCATION

§ 97.95. *Requirements for portable and mobile operation.*

(a) Within the continental limits of the United States or its possessions, an amateur station may be operated as either a portable or a mobile station on any frequency authorized and available for the amateur radio service. Notice of such operation in accordance with the provisions of § 97.97 shall be given to the Engineer in Charge of the radio district in which operation is intended.

(b) When outside the continental limits of the United States, its territories, or possessions, an amateur radio station may be operated as portable or mobile only under the following conditions:

(1) Operation may not be conducted within the jurisdiction of a foreign government except pursuant to, and in accordance with, express authority granted to the licensee by such foreign government. When a foreign government permits Commission licensees to operate within its territory, the amateur frequency bands which may be used shall be as prescribed or limited by that government. (See Appendix 4 of this Part for the text of treaties or agreements between the United States and foreign governments relative to reciprocal amateur radio operation.)

(2) When outside the jurisdiction of a foreign government: operation may be conducted within Region 2 on any amateur frequency band between 7.0 Mc/s and 148 Mc/s, inclusive; and when not within Region 2, operation may be conducted only on the amateur frequency bands 14.00-14.35 Mc/s, 21.00-21.45 Mc/s and 28.0-29.7 Mc/s. [NOTE: Region 2 is defined as follows: On the east, a line (B) extending from the North Pole along meridian 10° west of Greenwich to its intersection with parallel 72° north; thence by Great Circle Arc to the intersection of meridian 50° west and parallel 40° north; thence by Great Circle Arc to the intersection of meridian 20° west and parallel 10° south; thence along meridian 20° west to the South Pole. On the west, a line (C) extending from the North Pole by Great Circle Arc to the intersection of parallel 65° 30′ north with the international boundary in Bering Strait; thence by Great Circle Arc to the intersection of meridian 165° east of Greenwich and parallel 50° north; thence by Great Circle Arc to the intersection of meridian 170° west and parallel 10° north; thence along parallel 10° north to its intersection with meridian 120° west; thence along meridian 120° west to the South Pole.]

(3) Notice of such operation, in accordance with the provisions of § 97.97, shall be given to the Engineer in Charge of the district having jurisdiction of the authorized fixed transmitter location.

§ 97.97. *Notice of operation away from authorized location.* Whenever an amateur station is, or is likely to be, operated for a period in excess of 48 hours away from the fixed transmitter location specified on the station license without return thereto, the licensee shall give advance written notice of such operation to the Commission office or offices specified in § 97.95 or § 97.99. A new notice is required whenever there is any change in the particulars of a previous notice or whenever operation away from the authorized station continues for a period in excess of one year. The notice required by this section shall contain the following specific information:

(a) Name of licensee.
(b) Station call sign.
(c) Authorized fixed transmitter location.
(d) Portable location(s), or mobile itinerary as specifically as possible, or temporary fixed transmitter location, or new permanent fixed transmitter location.
(e) The dates of the beginning and end of each period of operation away from the location specified in the station license.
(f) The address at which, or through which, the licensee can be readily reached.
(g) In the case of mobile operation, the official name, registry number or license number (including the name of the issuing state or territory, if any) of the aircraft, vessel, or land vehicle in which the mobile station is installed and operated.

§ 97.99. *Special requirements for non-portable stations.* (a) An amateur station that has been moved from the authorized permanent location to another permanent location may be operated for a period not exceeding four consecutive months at the latter location, but in no event beyond the expiration of the license unless timely application for renewal thereof has been filed in accordance with the provisions of § 97.47 under the following conditions:

(1) Advance notice, in accordance with the provisions of § 97.97, shall be given to the Engineer in Charge of the radjo district in which operation is intended; and

(2) formal application for modification to change the permanent location shall be filed with the Commission within the above specified four-month period.

(b) The licensee of an amateur station who changes residence temporarily, but retains a permanent residence associated with the fixed transmitter location designated in the station

license, and moves his amateur station to a temporary location associated with his temporary residence, or the licensee-trustee for an amateur radio society which changes the normal location of its amateur station to a different and temporary location, may operate the station at such temporary location under the condition that: Notice, in accordance with the provisions of § 97.97, shall be given to the Secretary of the Commission, Washington, D.C. 20554, and to the Engineer in Charge of the radio district in which temporary operation is intended.

(c) When the station is operated under the provisions of this section, the portable identification procedures specified in §97.87 shall be used.

§ 97.101. *Special provisions for mobile stations aboard ships or aircraft.* In addition to complying with all other applicable rules, an amateur mobile station operated on board a ship or aircraft must comply with all of the following special conditions: (a) The installation and operation of the amateur mobile station shall be approved by the master of the ship or captain of the aircraft; (b) The amateur mobile station shall be separate from and independent of all other radio equipment, if any, installed on board the same ship or aircraft; (c) The electrical installation of the amateur mobile station shall be in accord with the rules applicable to ships or aircraft as promulgated by the appropriate government agency; (d) The operation of the amateur mobile station shall not interfere with the efficient operation of any other radio equipment installed on board the same ship or aircraft; and (e) The amateur mobile station and its associated equipment, either in itself or in its method of operation, shall not constitute a hazard to the safety of life or property.

Logs

§ 97.103. *Station log requirements.* Each licensee of an amateur station shall keep an accurate log of station operation, which shall include the following:

(a) The date and time of each transmission, except that for a period of continuous mobile operation the time of each transmission may be omitted, provided that the dates and times of commencing and terminating such mobile operation are entered in the log. (The date need only be entered once for each day's operation. The expression "time of each transmission" means the time of making a call and need not be repeated during the sequence of communication which immediately follows; however, an entry shall be made in the log when signing off so as to show the period during which communication was carried on.)

(b) The signature of each licensed operator who manipulates the key of a radiotelegraph transmitter; the signature of each licensed operator who operates a transmitter of any other type; and the name of any person not holding an amateur operator license who either directly or by recording transmits by voice over a radiotelephone transmitter or operates a teleprinter keying a radiotelegraph transmitter. (The signature of the operator need only be entered once in the log in those cases when all transmissions are made by or under the supervision of the signatory operator, provided a statement to that effect also is entered. The signature of any other operator who operated the station shall be entered in the proper space for that operator's transmission.)

(c) Call sign of the station called. (This entry need not be repeated for calls made to the same station during any sequence of communication, provided the time of signing off is given.)

(d) The input power to the oscillator, or to the final amplifier stage where an oscillator-amplifier transmitter is employed. (This need be entered only once, provided the input power is not changed.)

(e) The frequency band used. (This information need be entered only once in the log for all transmissions until there is a change in frequency to another amateur band.)

(f) The type of emission used. (This need be entered only once until there is a change in the type of emission.)

(g) The location of the station (or the approximate geographical location of a mobile station) at the time of each transmission. (This need be entered only once provided the location of the station is not changed. However, suitable entry shall be made in the log upon changing the location. Where operating at other than a fixed location, the type and identity of the vehicle or other mobile unit in which the station is operated shall be shown.)

(h) The message traffic handled. (If record communications are handled in regular message form, a copy of each message sent and received shall be entered in the log or retained on file at the station for at least 1 year.)

§ 97.105. *Retention of logs.* The log shall be preserved for a period of at least 1 year following the last date of entry. The copies of record communications and station log required by § 97.103 shall be available for inspection by authorized representatives of the Commission.

Emergency Operations

§ 97.107. *Operation in emergencies.* In the event of an emergency disrupting normally available communication facilities in any widespread area or areas, the Commission, in its discretion, may declare that a general state of communications emergency exists, designate

the area or areas concerned, and specify the amateur frequency bands, or segments of such bands for use only by amateurs participating in emergency communication within or with such affected area or areas. Amateurs desiring to request the declaration of such a state of emergency should communicate with the Commission's Engineer in Charge of the area concerned. Whenever such declaration has been made, operation of and with amateur stations in the area concerned shall be only in accordance with the requirements set forth in this section, but such requirements shall in no wise affect other normal amateur communication in the affected area when conducted on frequencies not designated for emergency operation.

(a) All transmissions within all designated amateur emergency communication bands other than communications relating directly to relief work, emergency service, or the establishment and maintenance of efficient amateur radio networks for the handling of such communications, shall be suspended. Incidental calling, answering, testing or working (including casual conversation, remarks or messages) not pertinent to constructive handling of the emergency situation shall be prohibited within these bands.

(b) The Commission may designate certain amateur stations to assist in the promulgation of information relating to the declaration of a general state of communications emergency, to monitor the designated amateur emergency communications bands, and to warn non-complying stations observed to be operating in those bands. Such station, when so designated, may transmit for that purpose on any frequency or frequencies authorized to be used by that station, provided such transmissions do not interfere with essential emergency communications in progress; however, such transmissions shall preferably be made on authorized frequencies immediately adjacent to those segments of the amateur bands being cleared for the emergency. Individual transmissions for the purpose of advising other stations of the existence of the communications emergency shall refer to this section by number (§ 97.107) and shall specify, briefly and concisely, the date of the Commission's declaration, the area and nature of the emergency, and the amateur frequency bands or segments of such bands which constitute the amateur emergency communications bands at the time. The designated stations shall not enter into discussions with other stations beyond furnishing essential facts relative to the emergency, or acting as advisors to stations desiring to assist in the emergency, and the operators of such designated stations shall report fully to the Commission the identity of any stations failing to comply, after notice, with any of the pertinent provisions of this section.

(c) The special conditions imposed under the provisions of this section shall cease to apply only after the Commission, or its authorized representative, shall have declared such general state of communications emergency to be terminated; however, nothing in this paragraph shall be deemed to prevent the Commission from modifying the terms of its declaration from time to time as may be necessary during the period of a communications emergency, or from removing those conditions with respect to any amateur frequency band or segment of such band which no longer appears essential to the conduct of the emergency communications.

Subpart E — Prohibited Practices and Administrative Sanctions

Prohibited Transmissions and Practices

§ 97.111. *No remuneration for use of station.* An amateur station shall not be used to transmit or receive messages for hire, nor for communication for material compensation, direct or indirect, paid or promised.

§ 97.113. *Broadcasting prohibited.* Subject to the provisions of § 97.91, an amateur station shall not be used to engage in any form of broadcasting, that is, the dissemination of radio communications intended to be received by the public directly or by the intermediary of relay stations, nor for the retransmission by automatic means of programs or signals emanating from any class of station other than amateur. The foregoing provision shall not be construed to prohibit amateur operators from giving their consent to the rebroadcast by broadcast stations of the transmissions of their amateur stations, provided, that the transmissions of the amateur stations shall not contain any direct or indirect reference to the rebroadcast.

§ 97.115. *Music prohibited.* The transmission of music by an amateur station is forbidden.

§ 97.117. *Codes and ciphers prohibited.* The transmission by radio of messages in codes or ciphers in domestic and international communications to or between amateur stations is prohibited. All communications regardless of type of emission employed shall be in plain language except that generally recognized abbreviations established by regulation or custom and usage are permissible as are any other abbreviations or signals where the intent is not to obscure the meaning but only to facilitate communications.

§ 97.119. *Obscenity, indecency, profanity.* No licensed radio operator or other person shall transmit communications containing obscene, indecent, or profane words, language, or meaning.

§ 97.121. *False signals.* No licensed radio operator shall transmit false or deceptive signals or communications by radio, or any call letter or signal which has not been assigned by

proper authority to the radio station he is operating.

§ 97.123. *Unidentified communications.* No licensed radio operator shall transmit unidentified radio communications or signals.

§ 97.125. *Interference.* No licensed radio operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal.

§ 97.127. *Damage to apparatus.* No licensed radio operator shall willfully damage, or cause or permit to be damaged, any radio apparatus or installation in any licensed radio station.

§ 97.129. *Fraudulent licenses.* No licensed radio operator or other person shall obtain or attempt to obtain, or assist another to obtain to permit to be damaged, any radio apparatus by fraudulent means.

ADMINISTRATIVE SANCTIONS

§ 97.131. *Restricted operation.* (a) If the operation of an amateur station causes general interference to the reception of transmissions from stations operating in the domestic broadcast service when receivers of good engineering design including adequate selectivity characteristics are used to receive such transmissions and this fact is made known to the amateur station licensee, the amateur station shall not be operated during the hours from 8 P.M. to 10:30 P.M., local time, and on Sunday for the additional period from 10:30 A.M. until 1 P.M., local time, upon the frequency or frequencies used when the interference is created. (b) In general, such steps as may be necessary to minimize interference to stations operating in other services may be required after investigation by the Commission.

§ 97.133. *Second notice of same violation.* In every case where an amateur station licensee is cited within a period of twelve consecutive months for the second violation of the provisions of § § 97.61, 97.63, 97.65, 97.71, or 97.73, the station licensee, if directed to do so by the Commission, shall not operate the station and shall not permit it to be operated from 6 P.M. to 10:30 P.M., local time, until written notice has been received authorizing the resumption of full-time operation. This notice will not be issued until the licensee has reported on the results of tests which he has conducted with at least two other amateur stations at hours other than 6 P.M. to 10:30 P.M. local time. Such tests are to be made for the specific purpose of aiding the licensee in determining whether the emissions of the station are in accordance with the Commission's rules. The licensee shall report to the Commission the observations made by the cooperating amateur licensees in relation to the reported violations. This report shall include a statement as to the corrective measures taken to insure compliance with the rules.

§ 97.135. *Third notice of same violation.* In every case where an amateur station licensee is cited within a period of twelve consecutive months for the third violation of § § 97.61, 97.63, 97.65, 97.71 or 97.73, the station licensee, if directed by the Commission, shall not operate the station and shall not permit it to be operated from 8 A.M. to 12 midnight, local time, except for the purposes of transmitting a prearranged test to be observed by a monitoring station of the Commission to be designated in each particular case. The station shall not be permitted to resume operation during these hours until the licensee is authorized by the Commission, following the test, to resume full-time operation. The results of the test and the licensee's record shall be considered in determining the advisability of suspending the operator license or revoking the station license, or both.

§ 97.137. *Answers to notices of violations.* Any licensee receiving official notice of a violation of the terms of the Communications Act of 1934, as amended, any legislative act, Executive order, treaty to which the United States is a party, or the rules and regulations of the Federal Communications Commission, shall, within 10 days from such receipt, send a written answer, direct to the office of the Commission originating the official notice: *Provided, however,* That if an answer cannot be sent nor an acknowledgment made within such 10-day period by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay. The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus, the answer shall state fully what steps, if any, are taken to prevent future violations, and if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and promised date of delivery. If the notice of violation relates to some lack of attention or improper operation of the transmitter, the name of the operator in charge shall be given.

§ 97.139. *Revocation of station license and issuance of cease and desist orders.*

(a) Whenever it appears that a station license should be revoked for any of the reasons set forth in section 312 (a) of the Communications Act of 1934, as amended, or a cease and desist order should be issued for any of the reasons specified in section 312 (b) of the act, the Commission will issue an order directing the licensee to show cause why an order of revocation or a cease and desist order,

as the case may be, should not be issued.

(b) Any order to show cause issued in accordance with paragraph (a) of this section will contain a statement of matters with respect to which the Commission is inquiring and will call upon the licensee to appear before the Commission at a time and place stated in the order, but in no event less than thirty (30) days after the receipt of such order, and give evidence upon the matter specified therein; except that where safety of life or property is involved, the Commission may provide in the order for a shorter period.

(c) In order to avail himself of the opportunity to appear before the Commission at the time and place stated in the show cause order to give evidence upon the matter specified therein, the licensee, in person or by his attorney, shall, within 30 days of the receipt of the order, or such shorter period as may be specified therein if the safety of life and property is involved, file with the Commission, in triplicate, a written appearance stating that he will appear and present evidence on the matter specified in the order.

(d) The hearing on the matter specified in the order to show cause, and the practice and procedure in connection therewith, shall accord with the provisions of Subparts A and B of Part 1 of this chapter, except that in all such hearings the burden of proof shall be upon the Commission.

(e) If the licensee does not desire to appear before the Commission and give evidence upon the matter specified in the show cause order, he shall, within 30 days of the receipt of the order, or such shorter period as may be specified therein if the safety of life or property is involved, file with the Commission, in triplicate, a written waiver of hearing. Such waiver, which shall include the name of the licensee to whom the show cause order was addressed, the call letters of his station, if any, and the docket number of the proceeding, may be accompained by a statement of reasons why the licensee believes that the order of revocation or a cease and desist order, as the case may be, should not be issued.

(f) If the licensee fails timely to respond to an order to show cause or fails to appear at a hearing, such failure will be deemed a waiver of hearing.

(g) If the licensee waives a hearing in accordance with the provisions of paragraph (e) of this section and fails to submit a statement therewith showing why he believes an order of revocation or a cease and desist order should not be issued, or if he is deemed to waive a hearing in accordance with the provisions of paragraph (f) of this section, the allegations specified in the order to show cause will be deemed to be admitted and a decision will be issued by the Commission invoking the sanction specified in the order to show cause. If a hearing is waived pursuant to paragraph (e) of this section but a written statement as to why an order of revocation or cease and desist order should not be issued is submitted, the Commission will, on the basis of the facts before it as supplemented by such written statement, issue a decision stating its reasons for invoking the sanction specified in the order to show cause or for dismissing the proceeding, as the case may be: *Provided,* That where the written statement contains factual allegations contrary to those upon which the show cause order was based, the Commission may call upon the submitting party to furnish additional information under oath, or, if necessary, designate the proceeding for oral hearing. The decisions of the Commission referred to in this paragraph shall have the same effect as an initial decision, and the procedure to be followed thereafter shall be the same as in the case of an initial decision issued in the course of the regular hearing procedure (see § § 1.204, 1.276, 1.277, 1.279, and 1.282 of this chapter).

(h) Any order of revocation or cease and desist order issued pursuant to this section shall include a statement of the findings and the grounds and reasons therefor and specify the effective date of the order, and shall be served on said licensee.

§ 97.141. *Order of Suspension.* No order of suspension of any operator's license shall take effect until 15 days' notice in writing thereof, stating the cause for the proposed suspension, has been given to the operator licensee who may make written application to the Commission at any time within said 15 days for a hearing upon such order. The notice to the operator licensee shall not be effective until actually received by him, and from that time he shall have 15 days in which to mail the said application. In the event that physical conditions prevent mailing of the application at the expiration of the 15-day period, the application shall then be mailed as soon as possible thereafter, accompanied by a satisfactory explanation of the delay. Upon receipt by the Commission of such application for hearing, said order of suspension shall be held in abeyance until the conclusion of the hearing which shall be conducted under such rules as the Commission shall deem appropriate. Upon the conclusion of said hearing the Commission may affirm, modify, or revoke said order of suspension.

§ 97.143. *Proceedings.* Proceedings for the suspension of an operator's license shall in all cases be initiated by the entry of an order of suspension. Respondent will be given notice thereof together with notice of his right to be heard and to contest the proceeding. The ef-

fective date of the suspension will not be specified in the original order but will be fixed by subsequent motion of the Commission in accordance with the conditions specified above. Notice of the effective date of suspension will be given respondent, who shall send his operator license to the office of the Commission in Washington, D. C., on or before the said effective date, or, if the effective date has passed at the time notice is received, the license shall be sent to the Commission forthwith.

Subpart F — Radio Amateur Civil Emergency Service (RACES)

GENERAL

§ 97.161. *Nature of this service.* (a) The Radio Amateur Civil Emergency Service provides a temporary phase of amateur operation for Civil Defense communications purposes only, and the rules are limited in their force and effect to the period of the present national emergency, including any emergency which may necessitate invoking of the President's War Emergency Powers under the provisions of Section 606 of the Communications Act of 1934, as amended.

(b) Pursuant to the provisions of Section 4 (j) of the Communications Act of 1934, as amended, records relating to the Radio Amateur Civil Emergency Service shall not be open to general public inspection.

§ 97.163. *Definitions.* For the purposes of this Subpart, the following definitions are applicable:

(a) *Radio Amateur Civil Emergency Service.* A temporary radio-communication service carried on by licensed amateur radio stations while operating on specifically designated segments of the regularly allocated amateur frequency bands under the direction of authorized local, regional, or federal civil defense officials pursuant to an approved civil defense communications plan.

(b) *Radio Amateur Civil Emergency Station.* An amateur radio station which is authorized to operate in the Radio Amateur Civil Emergency Service for the purpose of transmitting and receiving civil defense communications.

(c) *Civil defense communications.* Communications or signals essential to the conduct of civil defense activities of duly authorized civil defense organizations, including communications directly concerning safety of life, preservation of property, maintenance of law and order, alleviation of human suffering and need and dissemination of warnings of enemy attack to the civilian population in case of actual or impending armed attack or in any disaster or other incident endangering the public welfare. Such communications may also include transmissions necessary to establishment and maintenance of the radio system and communications essential to the training of civil defense personnel.

(d) *Civil defense authority.* The legally appointed Director of Civil Defense, or his authorized alternate or representative, for the particular geographical area (city, county, etc.) which a proposed radio station is intended to serve, and who is responsible to local governmental authority for protection and aid to the civilian population in the event of armed attack or of any disaster or other incident endangering public safety.

(e) *Civil Defense Communication Officer.* The official of any duly constituted civil defense organization having direct responsibility under the Director of that organization for the provision, organization, maintenance, readiness, and utilization of all means of communication to be used by such civil defense organization in the performance of its lawful functions.

(f) *Civil Defense Radio Officer.* The duly designated official of a legally constituted civil defense organization who is directly responsible either to the Communications Officer or to the Director of such civil defense organization for the provision, organization, maintenance, readiness, and utilization of radio communications facilities for civil defense use.

(g) *Radio Amateur Civil Emergency Network.* All radio amateur civil emergency stations intended to be included in the civil defense communications plan of the area concerned and which operate, or are to operate, in conjunction with a single control station. Such network may be made up of several separately authorized radio amateur civil emergency stations or units of such stations, or may be made up of several units of the same station operated at different locations. In addition, the same radio amateur civil emergency station or any unit of such station may be a part of more than one network; e.g., the control station of one network may also be the control station or a member station of another network operated in conjunction therewith.

(h) *Net control station.* Any authorized Radio Amateur Civil Emergency Station unit designated by the civil defense radio officer, with the approval of the Director of Civil Defense or the Civil Defense Communications Officer, to direct the use and operation of other station units of the same Radio Amateur Civil Emergency Network.

(i) *Civil defense communications plan.* The plan under which communications facilities are provided to all branches and phases of the civil defense organization in the area concerned and for all of its activities. Such plan may be drawn up in accordance with the needs of the particular area affected and the facilities, including licensed radio operators and stations, available in that particular area. Plans need not be uniform, but to be acceptable to the Commission they must comply with the following:

(1) The plan must be clearly described in

writing, and it may include diagrams and sketches. It must include a general description of the facilities and personnel available to provide communications for civil defense purposes and the expected usage to be made thereof.

(2) The plan must have been approved by the state and federal civil defense authorities having jurisdiction of the area affected.

(3) The plan must include the name, address, official title, and a statement of the qualifications of the Civil Defense Radio Officer (and of any and all alternate Radio Officers) responsible for the organization, training, and utilization of the radio amateur civil emergency station networks under that plan, and the name, address, and official title of the civil defense official responsible for the coordination of all civil defense activities of the area concerned.

(4) The plan must include a general description of each radio amateur civil emergency station network under the jurisdiction of each respective Civil Defense Radio Officer, showing location of fixed installations, purpose, area of activity to be served, an estimate of the number of radio amateur stations and independent operating units of such stations intended to be used in the network, and a description, including the location and call sign of its control station and any alternate control station or stations.

(5) The plan must include a general statement as to the frequency bands to be used by the radio amateur civil emergency station networks and the approximate number of stations, or units of such stations, to be operated in each such band, together with a description of the method which has been adopted for liaison and coordination of frequency usage with other similar networks in the same and adjacent areas.

(6) The plan must include a statement setting forth the facilities available to the area and the procedures to be followed in determining the loyalty and general reliability of all civil defense Radio Officers, amateur radio station licensees and radio operators intended to be utilized in the implementation of that plan. (See § § 97.173 (b), 97.175 (e), and 97.203 (a).)

§ 97.165. *Applicability of Rules Governing Amateur Radio Stations and Operators.* In all cases not specifically covered by the regulations contained in this subpart licensed amateur stations authorized to be operated in the Radio Amateur Civil Emergency Service shall be governed by the provisions of the rules governing amateur radio stations and operators (Subparts A through E of this part) which are not in conflict herewith. In any case of conflict, the rules governing the Radio Amateur Civil Emergency Service shall govern in respect to any station operated in that service.

ORGANIZATION

§ 97.167. *Organization of networks.* To supplement or extend other means of communication available to the civil defense organization or to provide necessary communications for which no other means exist, local radio amateur civil emergency station networks shall be organized by the civil defense authority of the area concerned and under the immediate direction of the Civil Defense Radio Officer. Such networks shall include all licensed amateur radio stations which are intended to be included in the civil defense communications plan of the area concerned. In any particular area there may be several such networks and each network may be independent of the others. Whenever there is more than one network in the same area, all such networks must share, under a single civil defense communications plan, the available frequencies in an efficient and orderly manner. The various networks in adjacent areas shall establish proper liaison and a description of the arrangements made shall become a part of their respective civil defense communications plans. Such arrangements shall provide for the efficient sharing of frequencies, plans for operating procedure designed to avoid mutual interference, and the exchange of communications facilities upon an inter-area basis where need for such exchange may arise.

§ 97.169. *Approval of civil defense communications plans.* (a) All civil defense communications plans which provide for the utilization of radio amateur civil emergency stations for civil defense purposes must be submitted to and approved by the responsible state (or territorial) and federal civil defense authorities before the licensed amateur stations intended to be used will be authorized to operate in the radio amateur civil emergency service.

(b) Material changes or modifications in such civil defense communications plans which alter the basic information required shall be submitted for approval in the same manner as the original plans.

(c) Written certification of approval by the competent state and federal civil defense authorities of each civil defense communications plan, or of any changes or modifications thereof, shall accompany the copies of such plans, changes, or modifications, which are submitted to the Commission in accordance with the provisions of this part.

§ 97.171. *Certification of Civil Defense Radio Officer.* (a) Certification of the Civil Defense Radio Officer shall be made of FCC Form 482. Such form shall be executed by the civil defense authority responsible for the coordination of all civil defense activities of the area concerned and show: (1) the name, address, and area of responsibility of such civil defense radio officer, (2) statement by him that he has

accepted such appointment and agrees to perform faithfully the duties of that office, including those prescribed by this subpart, (3) a certification by the responsible civil defense authority that he has satisfied himself that the named civil defense radio officer is fully qualified in accordance with the provisions of § 97.173, and (4) the effective date of the appointment of the civil defense radio officer and the name of any previous civil defense radio officer whose appointment is terminated.

(b) FCC Form 482, when completed in accordance with this section, shall be forwarded to the Commission via the responsible state and federal civil defense officials whose approval (or disapproval) shall be clearly indicated on the form.

§ 97.173. *Qualifications of Civil Defense Radio Officer.* No person shall be considered qualified as a Civil Defense Radio Officer until he shall have been found to satisfy the following minimum requirements.

(a) He shall hold either (1) a valid commercial radio operator's license of either first or second class (radiotelephone or radiotelegraph) issued by the Commission or (2) a valid amateur operator license issued by the Commission, other than the Technician or Novice Class.

(b) A determination shall have been made as to his loyalty to the United States and his general reliability, in accordance with the procedures provided in the approved civil defense communications plan of the area concerned.

(c) It shall have been determined that his technical and administrative qualifications are adequate for the proper performance of his duties.

§ 97.175. *Duties of Civil Defense Radio Officer.* The duties of the Civil Defense Radio Officer shall include among such other duties as may be assigned or as may be required in accordance with the provisions of this subpart:

(a) The direction and supervision of all radio stations forming the radio amateur civil emergency networks in accordance with the approved civil defense communications plan for the area involved.

(b) Provision for adequate monitoring of all transmissions of the stations under his supervision to assure compliance with the rules and regulations of the Commission, and to guard against improper use of the radio stations and intentional or inadvertent transmissions which might jeopardize the defense or security of the United States.

(c) The recommendation to the Commission for the granting of authorizations to individual amateurs for operation in this service, and certification to the Commission as to the loyalty to the United States and reliability of such individuals and the certification required in accordance with § 97.181.

(d) The recommendation to the Commission for cancellation of any authorization previously recommended or certified whenever subsequent investigation or circumstances indicate that the original recommendation or certification should not have been made.

STATION AUTHORIZATIONS

§ 97.177. *Station authorization required.* No radio station may be operated in the Radio Amateur Civil Emergency Service except pursuant to an authorization for such operation issued by the Federal Communications Commission.

§ 97.179. *Eligibility for station authorization.* An authorization to operate a station in the Radio Amateur Civil Emergency Service will be issued only to a person who holds an amateur radio operator license, other than Technician or Novice Class, and an appropriate amateur radio station license.

§ 97.181. *Filing of application.* Each application for station authorization or for renewal thereof shall be submitted on FCC Form 481-1, signed by the applicant and countersigned by the appropriate civil defense radio officer, who shall certify to the following:

(a) That the applicant has satisfied all requirements (both local and federal) for participation in the civil defense organization and is actually enrolled as a member of the local organization which serves the area where the station will operate.

(b) That the amateur station licensed in the name of the applicant has been approved for and, when authorized by the Commission, will actually constitute a unit of a civil defense communications network in accordance with an approved civil defense communications plan or amendment thereof.

§ 97.183. *Additional data required.* Each application for a station authorization in the Radio Amateur Civil Emergency Service shall be accompanied by the following data unless such material has already been submitted to the Commission, in which case the application shall clearly identify the material previously submitted:

(a) A copy of the approved communications plan (as defined in this part) for the civil defense communications network in which the station will operate, together with a copy of each approved amendment, change or modification of that plan.

(b) The official certification of the Civil Defense Radio Officer as provided in this subpart.

§ 97.185. *Single application for all equipment under one amateur station license.* Only one application need be filed for any one amateur station, including all transmitting equipment under the control of the licensee of that station, even though individual units of such station are capable of being operated and

are intended to be operated independently at different locations, or as portable or mobile stations with no fixed locations. No distinction need be made between those units which are personally owned by the amateur station licensee and those units which are otherwise under his technical control for operation in this service.

§ 97.187. *Issuance of station authorization.* An authorization to operate in this service will be issued in the discretion of the Commission upon satisfactory completion of all requirements of this subpart and proper certification that the requirements of the civil defense organization for which the station will be used have been or are being complied with. The station authorization (Form 481-3) will be forwarded to the Civil Defense Radio Officer for delivery to the applicant. Such authorization will be accompanied by a stub (Form 481-2) which may be retained by the civil defense radio officer for his records.

§ 97.189. *Term of station authorization.* (a) Authorization to operate an amateur station in the Radio Amateur Civil Emergency Service will be issued for a term running concurrently with the term of the amateur radio station license. Application for renewal of such authorization shall be filed concurrently with application for renewal of the basic amateur radio station license.

(b) Whenever, under rules contained in Subparts A through E of this part, modification of the basic amateur station license becomes nesessary, if such modification affects the information submitted with the original application for authorization in the Radio Amateur Civil Emergency Service, application for modification of the Radio Amateur Civil Emergency station authorization shall be submitted concurrently therewith.

(c) Nothing in this section shall be construed to alter or amend the temporary nature of a station authorization in the Radio Amateur Civil Emergency Service and the Commission's authority to cancel or amend it in accordance with the applicant's agreement as indicated on the initial application for station authorization.

§ 97.191. *Cancellation of station authorization.* (a) Each authorization for operation in the Radio Amateur Civil Emergency Service shall be issued with the express provision that such authorization is subject to revocation or cancellation without hearing whenever, in the opinion of the Commission, the security of the United States or the proper functioning of the Radio Amateur Civil Emergency Service would be served thereby or termination of the national emergency makes it unnecessary to continue the operation of stations in this service.

(b) The station authorization shall be submitted to the Commission (via the Civil Defense Radio Officer) for cancellation under the following circumstances:

(1) The station for which the authorization was issued becomes inactive for a period of three months or it is not planned to use the station in the radio amateur civil emergency network for a period of at least three months.

(2) The basic amateur radio station license of the station has expired and has not been renewed.

(3) In cases where the amateur radio station license and the radio amateur civil emergency station authorization have both been modified, the original authorization of the latter shall be submitted to the Commission immediately upon receipt by the licensee of a new or modified authorization.

TECHNICAL REQUIREMENTS

§ 97.193. *Frequencies available.* (a) The following tabulation indicates the frequencies and frequency bands, within the regularly allocated amateur frequency bands, which are available for use by stations in the Radio Amateur Civil Emergency Service. These frequencies and frequency bands may be used, on a non-exclusive basis (stations authorized in the Amateur Radio Service may also, pursuant to the provisions of § 97.61, use these frequencies or frequency bands until such time as national conditions require discontinuance of regular amateur operations), by the classes of radio amateur civil emergency stations or units of such stations indicated, and only with the types of emission shown in the right-hand column.

(1) For use only by authorized stations or units of such stations which are operated under the direct supervision of duly designated and responsible officials of the civil defense organization:

Frequency band	*Authorized emission*
1800-1825 kc/s[1]	0.1A1, 1.1F1, 6A3
1975-2000 kc/s[1]	0.1A1, 1.1F1, 6A3
3500-3510 kc/s	0.1A1, 1.1F1
3990-4000 kc/s	0.1A1, 1.1F1, 6A3, 6F3

[1] Use of frequencies in the band 1800-2000 kc/s is subject to the priority of the Loran system of radionavigation in this band and to the geographical frequency, emission and power limitations contained in § 97.61 of the Rules Governing Amateur Radio Stations and Operators (Subparts A through E of this Part). The use of these frequencies by stations authorized to be operated in the Radio Amateur Civil Emergency Service shall not be a bar to expansion of the radionavigation (Loran) service, and such use shall be considered temporary in the sense that it shall remain subject to cancellation or to revision in whole or in part, without hearing, whenever the Commission shall deem such cancellation or revision to be necessary or desirable in the light of the priority within this band of the Loran system of radionavigation.

(2) For use by all authorized stations only in the continental United States, except that, the bands 7245-7255 and 14,220-14,230 kc/s are also available in Alaska, Hawaii, Puerto Rico, and the Virgin Islands:

Frequency band	*Authorized emission*
3510-3516 kc/s	0.1A1, 1.1F1
3516-3550 kc/s[1]	0.1A1, 1.1F1
3984-3990 kc/s	0.1A1, 1.1F1, 6A3, 6F3
7097-7103 kc/s	0.1A1, 1.1F1
7103-7125 kc/s[1]	0.1A1, 1.1F1
7245-7255 kc/s[1]	0.1A1, 1.1F1, 6A3, 6F3
14047-14053 kc/s	0.1A1, 1.1F1
14220-14230 kc/s[1]	0.1A1, 1.1F1, 6A3, 6F3
21047-21053 kc/s	0.1A1, 1.1F1

[1] The availability of the frequency bands 3516-3550 kc/s, 7103-7125 kc/s, 7245-7247 kc/s, 7253-7255 kc/s, 14220-14222 kc/s and 14228-14230 kc/s for use during periods of actual civil defense emergency is limited to the initial 30 days of such emergency, unless otherwise ordered by the Commission.

(3) For use by all authorized stations:

Frequency or Frequency bands	*Authorized emission*
3997 kc/s[1]	0.1A1, 6A3
28.55-28.75 Mc/s	0.1A1, 6A3, 6F3, 6A4
29.45-29.65 Mc/s	0.1A1, 1.1F1, 6A3, 6A4, 40F3
50.35-50.75 Mc/s	0.1A1, 6A2, 6F2, 6A3, 6F3, 6A4
53.30 Mc/s[1]	40F3
53.35-53.75 Mc/s	0.1A1, 1.1F1, 6A2, 6F2, 6A3, 6A4, 40F3
145.17-145.71 Mc/s	0.1A1, 1.1F1, 6A2, 6F2, 6A3, 6A4, 40F3
146.79-147.33 Mc/s	0.1A1, 1.1F1, 6A2, 6F2, 6A3, 6A4, 40F3
220-225 Mc/s	0.1A1, 1.1F1, 6A2, 6F2, 6A3, 6A4, 40F3

[1] For use in emergency areas when required to make initial contact with military units; also, for communication with military stations on matters requiring coordination.

(b) The selection and use of specific frequencies within the authorized frequency bands by stations in the Radio Amateur Civil Emergency Service shall be in accordance with a coordinated local area and adjacent area civil defense communications plan and applicable rules of this part.

(c) Except as provided in paragraph (d) of this section, at such time as any or all of these frequency bands are withdrawn from availability to stations operating in the Amateur Radio Service, such bands shall be jointly available to stations in the Radio Amateur Civil Emergency Service and to stations in the military services for training and tactical operations. At that time, in areas where interference might occur, local mutual arrangements shall be made regarding times of operation such as to preclude or satisfactorily alleviate interference. In time of actual civil defense emergency, stations in the Radio Amateur Civil Emergency Service shall have absolute priority.

(d) In the band 220 to 225 Mc/s, stations operating in the Radio Amateur Civil Emergency Service shall not at any time cause harmful interference to the government radiolocation service.

§ 97.195. *Classification of emissions.* (a) For the purpose of this subpart, the authorized emissions, as contained in the table of § 97.193, are defined as follows:

0.1A1 — Continuous wave telegraphy.
1.1F1 — Frequency shift telegraphy.
6A2 — Telegraphy amplitude modulated at audio frequency.
6F2 — Telegraphy frequency modulated at audio frequency.
6A3 — Commercial quality amplitude modulated telephony.
6F3 — Narrow band frequency or phase modulated telephony.
40F3 — Wide band frequency or phase modulated telephony.
6A4 — Amplitude modulated facsimile.

(b) On frequencies where wide band frequency or phase modulated telephony (40F3) is authorized, narrow band frequency or phase modulated telephony (6F3) may also be employed; similarly, where commercial quality amplitude modulated telephony (6A3) is authorized, single or double sideband amplitude modulated telephony, with or without carrier or with reduced carrier, may also be employed.

§ 97.197. *Transmitter power.* The transmitting equipment of a radio station in this service shall be adjusted in such manner as to produce the minimum radiation necessary to carry out the communications desired. No station operating in this service shall use a direct current plate power input to the vacuum tube or tubes supplying energy to the antenna in excess of that permitted to be used by a licensed amateur radio station when operated on the same frequencies or in the same frequency bands in accordance with the provisions of the Rules Governing Amateur Radio Stations and Operators (Subparts A through E of this part).

§ 97.199. *Equipment requirements.* (a) Except under the conditions specified in paragraph (b) of this section, all stations authorized to be operated in the Radio Amateur Civil Emergency Service shall be capable of receiving on the same frequencies or frequency bands utilized for transmission.

(b) When a station in this service is operated only on a single frequency or frequency band for cross-band operation in communication with a station or stations operating on another frequency or in another frequency band, or in other services, such station shall be cap-

able of receiving the station with which it is communicating.

(c) The direct modulation of an oscillator with a frequency stability less than that obtainable with crystal control, or the radiation of a signal having simultaneous amplitude and frequency or phase modulation, is prohibited on frequencies below 220 Mc/s.

§ 97.201. *Alleviation of harmful interference.* (a) When emissions of stations in the Radio Amateur Civil Emergency Service, other than those necessary to carry on the desired communications, cause harmful interference to stations in this or any other service, the Commission may in its discretion, require appropriate technical changes in the equipment to alleviate the interference.

(b) When the emissions of stations in the Radio Amateur Civil Emergency Service that are necessary to carry on the desired communications cause harmful interference to stations in other radio services, appropriate action shall be taken to alleviate such interference including, if necessary, the suspension (except during times of an actual state of civil emergency) of such emissions as cause the interference.

OPERATING REQUIREMENTS

§ 97.203. *Operator requirements.* (a) No person shall operate a station in the Radio Amateur Civil Emergency Service unless (1) that person holds a valid radio operator license of the proper grade, as described in this section, and (2) that person holds a valid written certification by the chief of the local, regional, or state Civil Defense organization of the area in which he serves that he has satisfied all federal, state, and local requirements for enrollment in the Civil Defense organization as a radio operator and is actually enrolled therein. Such certification shall clearly indicate that a determination has been made as to his loyalty to the United States and general reliability in accordance with the procedures described in the approved civil defense communications plan for the area concerned. (See § § 97.163 (i) and 97.169.)

(b) The person manipulating the key of a manually operated radiotelegraph transmitter of a station authorized to operate in this service shall hold either (1) any class of amateur operator license issued by the Commission, other than the Technician or Novice Class, or (2) any class of commercial radiotelegraph operator license issued by the Commission other than the Temporary Limited Radiotelegraph Second Class Operator License, together with the certification required in accordance with the provisions of paragraph (a) of this section.

(c) Except as specifically provided in paragraphs (a) and (b) of this section, any station in the Radio Amateur Civil Emergency Service may be operated by the holder of any class of amateur or commercial radio operator license issued by the Commission other than a Temporary Limited Radiotelegraph Second Class Operator License or an Aircraft Radiotelephone Operator Authorization; *Provided,* That, when such operation is performed by the holder of a Novice Class amateur operator license or by the holder of a commercial radiotelephone or radiotelegraph third class operator license or restricted operator permit: (1) such operator shall be prohibited from making any adjustments that may result in improper transmitter operation, (2) the equipment shall be so designed and installed that none of the operations necessary to be performed during the course of the normal rendition of the service of the station may cause off-frequency operation or result in any unauthorized radiation, and (3) any needed adjustments of the transmitter that may affect the proper operation of the station shall be regularly made by or under the immediate supervision and responsibility of the holder of either an amateur operator license other than the Novice Class or a commercial radiotelephone or radiotelegraph first or second class operator license.

(d) All adjustments or tests during or coincident with the installation, servicing or maintenance of the transmitting equipment of a station in this service shall be made only by or under the immediate supervision and responsibility of the holder of either (1) an amateur operator license other than the Novice Class or (2) a commercial radiotelephone or radiotelegraph first or second class operator license issued by the Commission who in addition holds the certification required in accordance with the provisions of paragraph (a) of this section.

§ 97.205. *Operation at other than licensed location.* A station in this service, or any unit thereof, may be operated at any location in accordance with the approved civil defense communications plan for the area concerned in the discretion of and as directed by the Civil Defense Radio Officer, without notice to the Commission and without limitation as to the length of time within which such operation takes place: *Provided,* That nothing in this section shall be construed to waive the necessity for modification of the authorization of a station in this service when the address of the licensee or the basic location of the station is changed, or for any other reason where because of a change of the communications plan or other reason the information heretofore furnished the Commission with the original application may be materially altered or changed.

§ 97.207. *Availability of station authorizations and operator licenses.* (a) The original station authorization permitting operation of the licensed amateur station in the Radio

Amateur Civil Emergency Service, or a photocopy thereof, shall be permanently attached to each transmitter of such station, including each transmitter which is capable of being operated and intended to be operated independently at different locations, if the transmitter is readily accessible, or, if the control position is located at a place other than the transmitter location, it may be posted at the control position; *Provided,* That, whenever a photocopy of the station authorization is utilized in compliance with the requirement of this paragraph, the original station authorization shall be made available for inspection upon reasonable request from any authorized representative of the Federal Government.

(b) The original radio operator license, or a verification card (FCC Form 758-F) in the case of the holder of a commercial radio operator license of the diploma type, of the operator controlling the emissions of a station authorized to be operated in this service together with the certification required by § 97.203 (a), shall be carried on his person or kept immediately available at the place where he is operating the station or any independent unit of a station: *Provided,* That whenever a verification card (FCC Form 758-F) is utilized in compliance with the requirement of this paragraph, the original operator license shall be made available for inspection upon reasonable request from an authorized representative of the Federal Government.

(c) When a licensed amateur station, or an independent unit of such station, is operated at a location other than that shown in its license in compliance with the provisions of this subpart, the basic amateur station license required by Subparts A through E of this part need not be readily available at the station or unit location, but shall be made available for inspection upon reasonable request from any authorized representative of the Federal Government.

§ 97.209. *Radio station log.* (a) Except as otherwise expressly provided in this subpart, there shall be maintained at each radio amateur civil emergency station, or unit of such station, an accurate log of all operations. The following information shall be recorded in such station log:

(1) The name and address of the station licensee, the regularly assigned call sign of the station and unit number if any, the name of the Radio Amateur Civil Emergency network or networks in which the station is normally operated, and the d.c. plate power input to the vacuum tube or tubes supplying energy to the transmitting antenna system. This information need be entered only once in the log unless there is a change in any of the items specified in this subparagraph, but the original entry and each change shall show the date on which the entry was made.

(2) The date and time of beginning and end of each period during which the station was operated, the purpose of such operation, and the frequencies or bands of frequencies on which the operation took place.

(3) The call signs or other identification of all stations or units of such stations with which communications are established or attempted during such period of operation.

(4) The signature of the licensed operator on duty and in charge of the operation of the station or unit of such station during each period of operation, and the signature of each licensed operator who manipulated the key of any manually operated radiotelegraph transmitter of such station or unit. The signature of the operator shall be entered with the date and time at the beginning and end of each period during which he performed the foregoing duties, and at least once on each page additional to the first page, covering the period for which he was the responsible operator. The signatures of any additional operators who operate the transmitter(s) during the regular watch of another operator and details to indicate the periods during which they operated the transmitter(s) shall be entered in the proper form.

(5) Upon completion of each period of operation for any purpose, there shall be entered in the log a summary of such operation describing the nature thereof and, if message traffic or other record communication were exchanged with other stations, an estimate of the amount of such traffic handled together with a report on any unusual delays which were experienced in the delivery of such messages.

(6) There shall be no erasure, obliteration or destruction of any part of the log of any station or station unit. Corrections shall be made by striking out the erroneous portion and initialing and dating the corrections.

(b) Mobile radio amateur civil emergency stations or station units, and portable radio amateur civil emergency stations or station units, where not being operated at predetermined fixed locations, shall be exempt from the requirements of maintaining a log to the extent that the entries required under the preceding paragraph of this section are substantially contained in the log of another station or civil emergency networks. All stations or station units operating in accordance with the provisions of this subpart shall be exempt from the requirements concerning station logs contained in Subpart D of this part whenever it is shown that compliance with these requirements would interfere with the expeditious handling of civil defense communications or communication drills.

(c) The current portion of the log shall be kept at the location of the operating or control

position of the station or unit. Other portions of the log shall be retained by the licensee for a period of one year, at a place determined by the civil defense Radio Officer to be appropriate and advisable: *Provided,* That the logs of a station in this service shall be made available for inspection upon reasonable request by any authorized representative of the Federal Government; and *Provided further,* That those portions of any log covering operation of a station in this service in connection with any actual condition jeopardizing the public safety or affecting the national defense or security shall not be destroyed unless prior approval for such destruction shall have been received from the Commission.

§ 97.211. *Station identification.* (a) Stations operating in the Radio Amateur Civil Emergency Service shall identify themselves in the same manner and under the same conditions as prescribed in the Rules Governing Amateur Radio Stations and Operators (Subpart D of this part), except that:

(1) Additional designators to indicate portable or mobile operation, or to indicate operation at a location other than that specified in the station license, shall not be used.

(2) When engaged in network operation, after a station or unit has been fully identified at least once, further identification by that station or unit may be accomplished by the use of abbreviated call signs or other distinctive signals prescribed by the civil defense Radio Officer in lieu of the call signs otherwise required to be transmitted by that station or unit. A record of such abbreviated call signs or other distinctive signals shall be maintained by the Radio Officer and shall be made available for inspection upon reasonable request by any authorized representative of the Federal Government.

(b) When two or more separate units of a station, which is authorized to be operated in the Radio Amateur Civil Emergency Service, are operated independently at different locations, each unit shall separately identify itself by the addition of a unit number at the end of its call sign. When transmitting by telegraphy such additional identification shall immediately follow the basic call sign and to avoid confusion with portable or mobile indicators, shall not be separated therefrom by the use of the "slant" or fraction bar, or other punctuation mark or symbol.

§ 97.213. *Tactical call signs.* Stations operating in this service, and independent units of such stations, may be assigned tactical or secret call signs by the Commission or by competent civil defense authority, and may utilize such tactical call signs in lieu of the call signs appearing on the station licenses when such use is directed by competent civil defense authority; *Provided,* That a list of all such tactical call signs assigned stations under his direction shall be maintained by the civil defense Radio Officer and shall be made available for inspection upon reasonable request by any authorized representative of the Federal Government and *Provided further,* That when such tactical call signs are intended to be used at times other than during communications in connection with actual or impending conditions which appear to jeopardize the defense or security of the United States, a list of such tactical call signs and the stations or units to which assigned shall be furnished the Commission prior to such use.

USE OF STATIONS

§ 97.215. *Limitations on use of stations.* (a) No station authorized to be operated in this service, other than a control station as defined in this subpart, shall be operated for the purpose of transmitting any signal, message, or other communications except with the permission and under the operational control of the control station of the network in which it is operating: *Provided,* That nothing in the foregoing shall be construed to prohibit the transmission by any station or unit of a station of such signals as may be necessary for the purpose of alerting or making contact with the control station of the network, or for the purpose of transmitting actual emergency civil defense communications if the control station is disabled or is otherwise inoperative.

(b) Nothing in this section shall be construed to prevent the operation of a station which is authorized to be operated in this service for the purpose of brief tests or adjustments during or coincident with the installation, servicing or maintenance of such station: *Provided,* That the transmissions of that station during such tests or adjustments shall not cause harmful interference to the conduct of communications by any other station.

(c) No station in this service shall be used to transmit or to receive messages for hire, nor to transmit communications for material compensation, direct or indirect, paid or promised.

§ 97.217. *Hours of operation.* Stations in this service may be operated at such times and under such conditions as may be prescribed by the Communications Officer or other responsible official of the civil defense organization having jurisdiction over the area which the station will serve: *Provided,* That the communications of such stations shall at all times be in accordance with the permissible communications authorized in this subpart.

§ 97.219. *Points of communication.* Stations in this service may communicate with each other, with stations in the Disaster Communications Service and with stations of the United States Government which are authorized to exchange communications with stations in this

service by the particular agency having control. In addition, stations in this service may communicate, for the purpose of exchanging civil defense communications, with any other station in any service provided by the Commission's rules whenever such station is authorized to communicate with stations in the Radio Amateur Civil Emergency Service by the provisions of the Commission's rules governing the class of station concerned or in accordance with the provisions of § 2.405 of this chapter.

§ 97.221. *Permissible communications.* Stations in this service are authorized to transmit only the following types of civil defense communications:

(a) Communications for training purposes consisting of necessary drills and tests to insure establishment and maintenance of orderly and efficient operation of the radio amateur civil emergency networks and such other radio stations and networks as may be associated therewith for the conduct of civil defense communications, including communications directly concerned with the conduct of practice alerts, practice blackouts, practice mobilization and other comparable situations as may be ordered or initiated by competent civil defense authority or by the United States Governmental or military authority charged with the defense of the area concerned. All messages which are transmitted in connection with such drills, exercises and tests shall be clearly identified as such by the use of any one of the words "Drill" or "Exercise" or "Test" in the body of such messages.

(b) Communications when there is an impending or actual condition jeopardizing the public safety or affecting the national defense or security.

(1) Communications directly concerning the activation of the radio amateur civil emergency station networks or such other radio stations and networks as may be associated with the networks for the conduct of civil defense communications.

(2) Communications directly concerning the conduct of service by the radio amateur civil emergency networks and such other radio stations and networks as may be associated therewith.

(3) Communications directly concerning safety of life, preservation of property, maintenance of law and order, alleviation of human suffering and need, and combating of armed attack or sabotage.

(4) Communications directly concerning the accumulation and dissemination of public information or instructions to the civilian population essential to the activities of the civil defense organization or that of other authorized governmental or relief agencies.

(5) Communications directly concerning the transaction of business essential to public welfare.

§ 97.223. *Use of codes and ciphers.* Any station in this service is authorized to transmit messages in codes and ciphers and to utilize any method of secret or coded authentication of its transmissions when such method of concealing the contents of messages or such authentication procedure is prescribed by the competent civil defense authority of the area served by the station and is approved by the cognizant federal civil defense authorities.

§ 97.225. *Priority of communications.* The order of priority of communications by stations in this service, when there is an impending or actual condition jeopardizing the public safety or affecting the defense or security of an area, shall be determined by the cognizant civil defense authority of the area concerned or his authorized representative.

§ 97.227. *Operating procedure.* The operating procedure, and the method of circuit control by the control station of each network, shall be determined by the responsible civil defense authority of the area concerned and shall, in general, conform as nearly as possible to the operating procedure normally followed in other services in the expeditious handling of message traffic by the method of transmission in use.

5. Morse Code

Although Morse code is the earliest form of radio communication, and has been supplemented with many other methods of conveying intelligence across the airwaves, it is far from obsolete.

Whether you plan to do most of your transmitting by telephone, teletype or television, you will find Morse code a handy thing to know. If you are a short-wave listener, you will find that a knowledge of Morse code adds immeasurably to the fascination of your hobby. If you are interested in getting a ham license, of course, the FCC has decreed that you **must** know the code.

Morse code has several advantages over other methods of communication. For one thing, a Morse signal will get through interference that would completely block voice. For another, a cw (continuous-wave) transmitter is cheaper and simpler than the equivalent voice unit.

LEARNING THE CODE

The best way to learn Morse is to have someone who knows it well teach it to you, either personally or as part of a group. The second best way is to learn it with someone else. The hardest way is to learn it by yourself.

If you must learn it by yourself, a tape recorder is an excellent aid. As you practice sending, you record the sounds; then you play them back and try to copy them. This will stop the tendency to send a lot faster than you can receive.

The Morse code lessons presented in this chapter are designed for either self or group learning. Take them one lesson at a time, and do not go on to the next lesson until you have learned the characters of the lesson you are on.

Send the study groups to the person you are working with (or into your tape recorder) slowly and carefully, don't rush—speed will come with practice; and then have him send them back to you.

Morse code letters are made up of "dots" and "dashes," but you must learn to think of these sounds as **di** and **dah.** A **dah** is as long as three **di's,** and the space between the elements of a letter is one **di** long. The space between letters is three **di's** long.

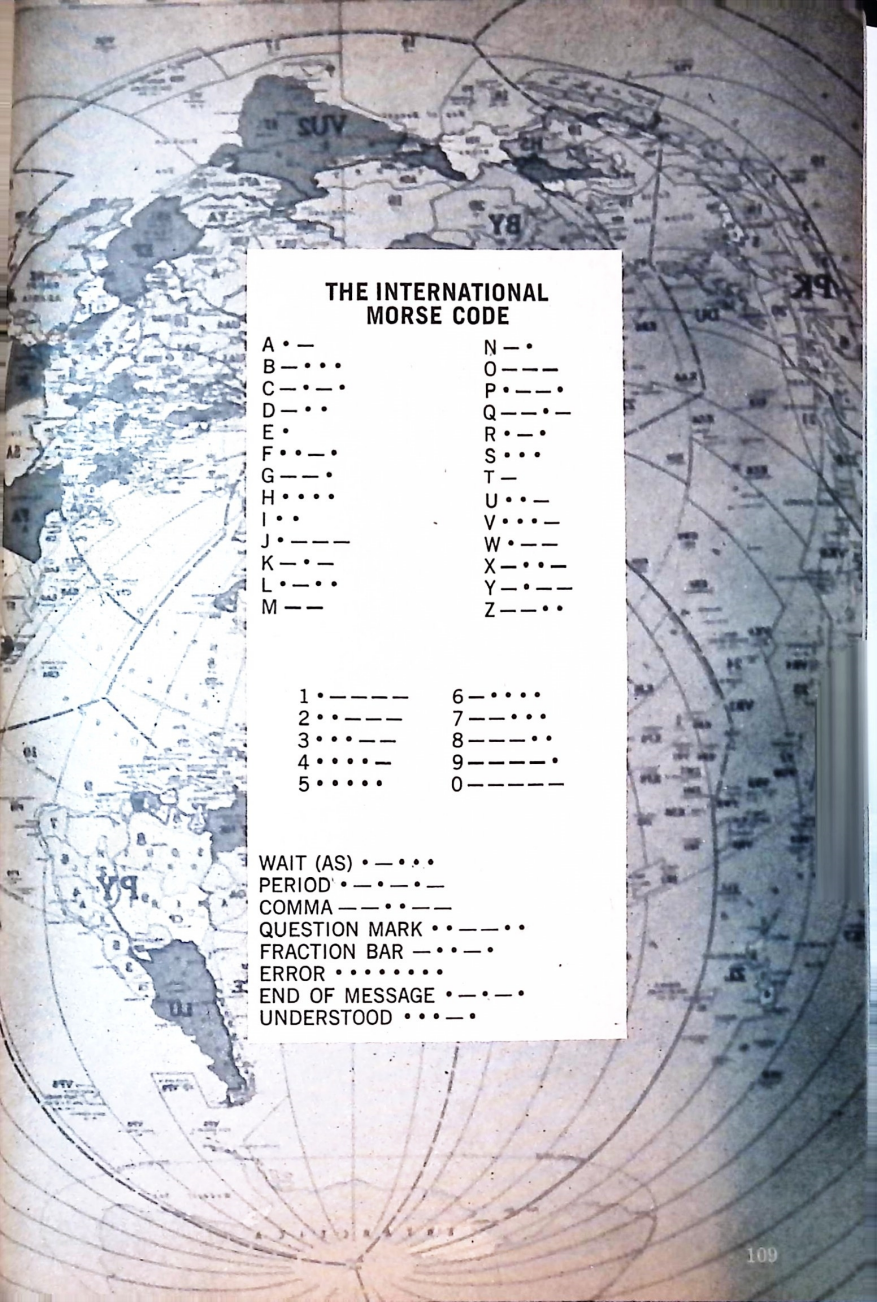
Before you do any practice sending at all you must learn what the various code letters and symbols are supposed to sound like over the air. If you already own a shortwave receiver this is no problem. Simply tune into one of the amateur bands, pick out a novice transmitting at a slow rate of speed and copy down whatever he sends.

If you have trouble locating a novice transmission try tuning in one of the stations listed in the following chart. They broadcast for code practice as indicated in the following chart.

Another source of code practice transmissions is the American Radio Relay League. They transmit under the call letters W1AW from Newington, Connecticut. On Monday, Wednesday and Friday at 2130 EST there are ten minutes of practice at 15, 20, 25, 30 and 35 words per minute. Other nights of the week speeds are 5, 7½, 10 and 13 words per minute. Practice at 10, 13 and 15 words per minute is broadcast daily from 1930 and 2000. Frequencies are 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,700 and 145,800 kilocycles.

Once listening is no longer a problem, then you can go on to transmitting. Start with a simple telegraph key and a doorbell buzzer. If possible use the key with a code oscillator purchased from a local electronics supplier.

LOCATION	TIME	DAYS	CALL SIGN	FREQUENCY (Kilocycles)	TRANSMISSION SPEED (Words per minute)
California	2300-0100	Monday Tuesday Wednesday Thursday Friday	NDW	4045	8, 10 & 12
Illinois	2100-2255	Sunday Monday Tuesday Wednesday	NSW	4800	10 & 15
Louisiana	2055	Sunday Monday Tuesday	NDF	2150 4010 5155	10 & 15
	1730	Monday Tuesday Wednesday Thursday	NDF	2150 4010 5155	10 & 15
Massachusetts	2015	Sunday Monday Tuesday	NDA	2484	12, 14 & 16
New York	1600-1700	Daily except Friday	WFK98	18,267	30
Washington	2230-0030	Sunday Monday Wednesday	NDP	7895	12, 14, 16 & 18
Washington, D.C.	2030	Monday	WAR/AIR	3347 6997.5 14,405 20,994	15, 20 & 25



THE INTERNATIONAL MORSE CODE

A • —	N — •
B — • • •	O — — —
C — • — •	P • — — •
D — • •	Q — — • —
E •	R • — •
F • • — •	S • • •
G — — •	T —
H • • • •	U • • —
I • •	V • • • —
J • — — —	W • — —
K — • —	X — • • —
L • — • •	Y — • — —
M — —	Z — — • •

1 • — — — —	6 — • • • •
2 • • — — —	7 — — • • •
3 • • • — —	8 — — — • •
4 • • • • —	9 — — — — •
5 • • • • •	0 — — — — —

WAIT (AS) • — • • •
PERIOD • — • — • —
COMMA — — • • — —
QUESTION MARK • • — — • •
FRACTION BAR — • • — •
ERROR • • • • • • • •
END OF MESSAGE • — • — •
UNDERSTOOD • • • — •

LESSON 1.

The best way to practice these lessons is with a key and a code practice oscillator. These can be bought at any ham radio supply store.

The key should be placed far enough back so that your entire forearm can rest on the table when you send. Your thumb should be on one side of the knob, the next two fingers on top, and the rest of your fingers on the other side. The spacing between the knob and the contact should be close, but still wide enough to need a positive motion of your wrist to depress the key. All of the motion in sending should be achieved with your wrist.

Morse code letters are made up of "dots" and "dashes," but you must learn to think of these sounds as **di** and **dah.** A **dah** is as long as three **di's,** and the space between the elements of a letter is one **di** long. The space between letters is three **di's** long. The space between words is six **di's** long.

There will be five letters, picked at random, in each lesson. The practice material is in five-letter groups to prevent the person receiving from anticipating the next letter in a word. There will also be words and messages for practice. Remember to think of each letter as a unit, and not as separate sounds. That is, "A" is **didah,** and not **di—dah.**

A *didah*
B *dahdididit*
D *dahdidit*
E *dit*
K *dahdidah*

PRACTICE:

AAAAA BABAB ADDDA BADAB DEEBB
BBBBB EDABB KKBBK EDAKE BKAKE
EEDBA DABKE KABED BBBBK KKKEE
BAADD KKKKK DKBAD ABDEK KDBAE
KEDAK ABEDA DDDDK KEDDA BAKED
KAKEE BAAAB ADEKA KDEKA DKDKD
KEKBB DDDDD EEKAD KDBAE ABEDE
KABEK DEDDD BDBDB DKAEA EEEDK
BEEEB DBAEA EKDDB DBAEK EKEDE
DEEDK BABDK KBDKB AEAEA EAKAE

KKKKK BKKEK DKEBK KDBEA KEBKA
DABBA ABADE KDEBK BDEKK KEDBK
KEDBA DEKAB BADEK BABDE DEBAK
DEKDE KDBKB DBBBB KEEEK EAKDB
BDKKE ADEBK EEEEE EEAEK EBBDK
DBAKE KDEBA DADDA KBAKD DKBKK
EDBKA EAKAE KKEBB EEKKK DKKDE
DEEDA KBBEA BEAKE BDEDE KEABD
EDAKA DDDDD KKKKD BEDAK KDEAB
AAEKK KEKEK BEEAA KEBAE KDDED

LESSON 2.

N *dahdit*
T *dah*
O *dahdahdah*
L *didahdidit*
I *didit*

PRACTICE:

NNNNN TONTO NOOOL LITLO TTOTT
INTOO TOTOL ITILT TTOOT NOLTI
OLNOI NOIOT NNOLL IIIII OLNIT
TOLIN NOTTI OILIT LOTII OTLIN
NTOLI TTOIL LLLLL NITLI TLITL TONLL
ITITI LOITO NIIOO ONION NOONI
NOTIL LOINT TOOLL OTLIT LONNT

TLTLN OTOLI NTONT LIONN NTTII
IINTN LITNO ONLIT LTNOL TNIIN INTIO
LITIN LTNNN LLLLL

OOOOO ODINB DNIKE BIDEN TBDKE
OATNE ADDIN EKIAL BEKLO TADLO
BOATA KEELI ETEBL LEADO BDNTL
NTBED KNIBE LIKEN DDIOT KDEAN
BEOKL TDKIL NKABE ENDBA NTOLA
BDEKI EDKLI TNTNT BOOKT TOOLN
BADON TKLEY EUEUE UEEEU KOTTO
NANAN BLIKE TOLID ALOTN DEOTK
ABEDO LIDBE KNKNK LDLNA KTAKL
TABLI LLLLL EDBIN TEETO BIIAA BAD
ONE LOT NOT TON NOT ABED I NEED
NITE TONED BOOK LIKEN TO BLEED
DEAL BALLOON TO LEAD LIKE BLOAT
LAKE NOTE BEAD AND BOTTLE BABE

People of all age groups and interests studying Morse Code at an Allied Radio code class. Such group study speeds learning.

LESSON 3.

C *dahdidahdit*
W *didahdah*
S *dididit*
Z *dahdahdidit*
R *didahdit*

PRACTICE:

CCCCC WCZZZ RSWCZ ZRSCW SSCRS
ZCCCZ SZRZR RWZWS CZWSR ZRWSC
WSWSW SZWCW ZZZZZ RSSZR CSWRZ
ZCWSR ZSSRS WCSRW RCWSS CWSSR
ZRZRZ WZZZW RSZCC WRWZW ZZWRS
CRWSZ RCZSR ZRCCW SRWCC CWSTC
WSCCZ SRRSW WWSRC ZRSWC SSSSS
SRSRS WZRSW CRSCZ SZRCW ZSSWC
SWCZZ CWRRC RWCWR SRWCZ RWCWZ
WCCWR CCCRC ZRSWC WSRZC CRWWC

CANR BNRTW WINDO WCILL DONAT
WABZR WONZS RABCD ENOTS BASTA
RDSIN ALLWD KCWTS ABZWR CCCRK
WAWOW DWTSR ONLIK EDCBA WERZI
BADWR TREWN ZONDE CBADZ KKRWN
ZOWDC NRRCE ABAIK TONWI ZKDBA
EDWAR ZSONI CKLZO RONCD BABCE
WZRTS KCINZ BCAKL SSONI LIKES
CABNO STWZC ZOZRZ WEEIS CKARN
TOTOE ARKNT OZIEW LCBOT NOTES

CDEKB AORTA WANTZ CEEDS BBOTT
WAZTR EKLTA OWWKK NOZER KZNBL
KSTOW ABCDE WDCLK RSWTN CBBBK
ONTOB WONDA KNOLK TSETZ KLKWB
ONTAB SRZNC RTWAB KLABC DINOW
BOKLA OOTNA SNERK CABDO BARKS

DZZEZ BOTLS CDCDB ERTSA ZWONB
WATTA WATTS ONCES KNOWS SWILL
ZOCKI WISCZ SNARD CNNBN DNBNZ
OBTRE WZCAB OERTA TITTS CITNI

BE A NICE LAD DANCE NOW ALL IS
STEAK WELL OR RARE DONE BEND
BACK DONT TREAD ON IT ATTACK
AT DAWN STRIKE NOW ZONE IS RED
ALERT WEST EAT AT BENS REAL BREAD
BEST INDECISION IS WEAKNESS COWS
CANT WALK

LESSON 4.

F *dididahdit*
P *didahdahdit*
Q *dahdahdidah*
U *dididah*
X *dahdididah*

PRACTICE:

FFFFF QPUXF PPQXX UPFQX XXFXX
PPQXX UXUPU FUXQP PFQXU UXPPF
QUXPF XUPPU UUPXP QQQQQ FPQPX
UUFPX PPXUP QUUPX FFUXP FQFQU
QFXFX FFFQU UXUXU PUXXP FPFUF
PUFFX FUPPQ PXPXP UUPFQ FPUXF
QUPFQ XXXXX UPFQX FFQQP XUXPQ
UFPUX FFPPQ PUXFQ PPUUF QUXPF
FPQUX FPPUX FPPPX UQXFF QUUFF
XUQFP PUUUF FUUXQ QFQUF XXXXX

XRAZE QXLNS OKPDQ NOSKZ WERTC
PPQWS QUIZZ ZZOXX SOCKS QATER
POTER CWQUS ASURE NOPED CWACK
PINDA RATER ZOXCW CRITS SNARP
RUPER TSBRE WERIE PAXQU EFFAR
TRANC POWER WWQZX BOTQW
WAAWZ CQCQC DEDED WNAFT POIKN
BFWAX REARQ BOXES QWERT ZXCBN
ETETE TOTAL NODEL QUWAX WRTDF
FOXES ZOPNQ OPERA CLASS WQACB
ZXOTI IIERB NLKIP UXQPF WAPED
PEERS WASPS BOOND OCKSZ POREW
BOCMK

QUIZ ALL PEOPLE AS TO BALLOON
BREAK AS SOON AS PAPER IS REAL
TAKE IT TO BE DISTRIBUTED STEP TO
TOP OF LADDER BUT BE CAREFUL IT
IS A LONE RANT EXTRA COPIES POS-
SESS ALL ATTRIBUTES OF FIRST ONES
OLD ONES SIT IN ENDLESS ROOMS A
QUOTE TO BE OR NOT TO BE ALL

LESSON 5.

G *dahdahdit*
H *didididit*
J *didahdahdah*
M *dahdah*
V *didididah*
Y *dahdidahdah*

PRACTICE:

GGGGG HHHHH VMJYY YHJGV MMVMY
GHMVY JJMVV HHVVY JYVYJ MYVGV
VMVMG JVYJH YVMVY JYYMV YJMGG
HVHJM VMJHH YJMVY VVVVV MYMJG
JMJMV GHYMV JMHGV YYYMY VYVJM
GMVYM JYJVJ YHJMH GYVMM MHVYG
MGGJJ VMYJM GMVHH MMVVY JMVJY
HVMYH VMMJV JHJHM VYMVY GHHHJ
MVMYG YVJYM MYYGG JJJJJ GMMVY
JVHHM GMYVM JMVMG GGHGJ MVGJV

ALTER TIGHO STRQZ XPONT OIGBE
WASPT BQWDR CCOPT MUKLE RAZVT
POKME TOQWD BPWET NNOTR ROPQZ
WESTS MOREN POSTR BBATG HJOTR
GHOST BOPQF JAGJT WBNMP QOTER
OTGOE POQWS BOTYL MOERT GGOPH
PORTB NNOWE ESTUP BPKIW BTOMN
QAZXS WEDCV FRTGB NHYUJ MKIOL
ZPALQ WMSKX OCIDJ EJRNF VHBGU
TYKJI IOPTE BOITE QWIBG EETEE
MISTS ONTOP OFTHE PLAIN WPOPT
OPERT BOTER OWPBY QWEFV BOTYU
WHENI NTHEC OURSE OFHUM ANEVE
NTSIT BOXES POHKR TQWEC ZZPMZ
GPIIT BOCEW ZOTER POKIT WAXES
BOPPE BOTWS QWSDF GHTYR TRIPE
FJDKS OPKLE BODDS POTTZ XRAYS
POBEW ZXOPT BOXEW PKLNM THOTS
THE QUICK BROWN FOX JUMPED OVER
THE LAZY DOGS BACK

Now that you have the complete alphabet, use textual material of your own choice to practice with.

LESSON 6.

Numbers

1. *didahdahdahdah*
2. *dididahdahdah*
3. *didididahdah*
4. *dididididah*
5. *dididididi*
6. *dahdididididit*
7. *dahdahdididit*
8. *dahdahdahdidit*
9. *dahdahdahdahdit*
0. *dahdahdahdahdah*

(The slash bar is put through the zero to distinguish it from an "O", this is standard radio communications procedure)

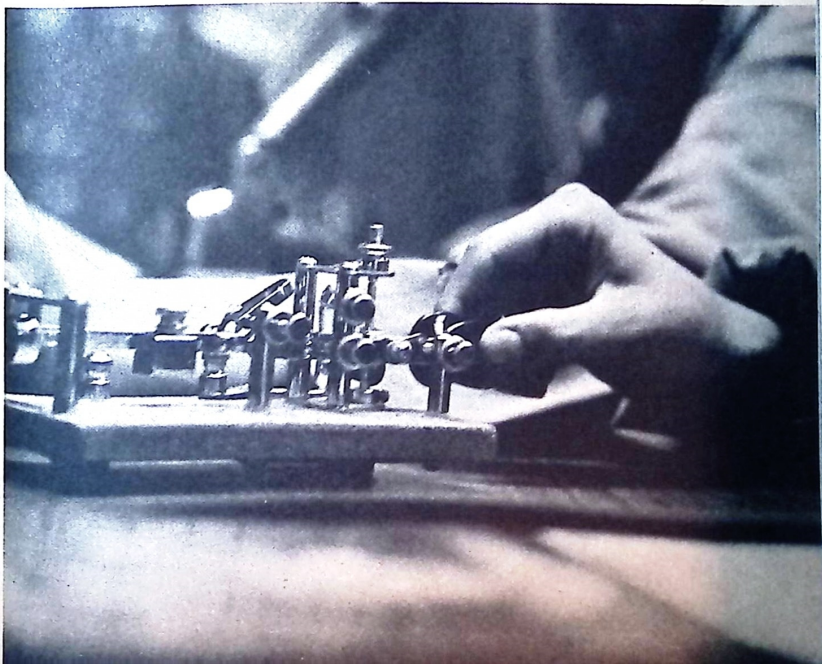
10395	38546	09856	12345	67890
13245	73945	09876	54321	19784
39685	48654	97143	72965	44765
09785	33426	78566	08945	12546
54657	85640	01265	49560	47834
22361	97856	03520	87956	23453
20568	38672	09870	99847	14352
08956	23089	67409	17352	22978
57684	05873	58634	75346	95867
01936	67301	59053	60934	21145

LESSON 7.

Punctuation marks

WAIT (AS)	*didahdididit*
PERIOD	*didahdidahdidah*
COMMA	*dahdahdididahdah*
QUESTION MARK	*dididahdahdidit*
FRACTION BAR	*dahdididahdit*
ERROR	*dididididididit*

The code sections of the Conditional and General Class amateur examinations contain punctuation marks, so it would be a good idea to learn them.



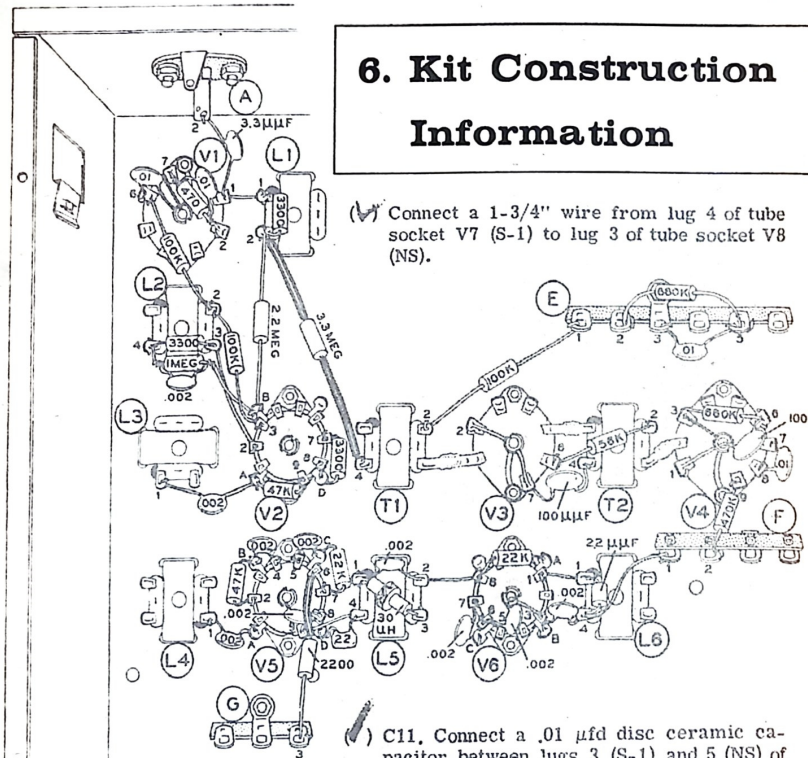
(✓) Connect a 3-1/4" wire from lug 1 of terminal strip P (NS) to lug 4 of tube socket V4 (NS).

(✓) Connect a 4-1/2" wire from lug 1 of terminal strip P (S-5) to lug 5 of tube socket V6 (S-1).

(✓) Connect a 4-3/4" wire from lug 2 of terminal strip P (S-5) to lug 4 of tube socket V6 (S-1).

6. Kit Construction Information

(✓) Connect a 1-3/4" wire from lug 4 of tube socket V7 (S-1) to lug 3 of tube socket V8 (NS).



(✓) C11. Connect a .01 μfd disc ceramic capacitor between lugs 3 (S-1) and 5 (NS) of terminal strip E.

(✓) R11. Connect a 56 KΩ (green-blue-orange) 1/2 watt resistor from lug 2 of transformer T2 (S-3) to lug 6 of tube socket V3 (NS).

( ) C10. Pass one lead of a 100 μμf disc ceramic capacitor through lug 7 (NS), through the center post (NS), to lug 2 of tube socket V3 (S-1). Connect the other lead to lug 4 of transformer T2 (NS). Now solder lug 7 of V3 (S-2).

Over the past ten years an increasing amount of electronic equipment has been sold in kit or partially constructed form. This has come about because kit manufacturers have been increasing the quality of their product until they have now reached the point where kits are almost foolproof to build and can offer the performance of factory-constructed equipment.

In purchasing and constructing a kit, you will save about 20-30 per cent of the factory assembled price, and, if you construct it carefully, you will have a piece of equipment that will function as well as one purchased already assembled.

Certain basic tools are required for assembling a kit. Normally you will need a screwdriver, a pair of long-nosed pliers, a pair of wirecutters and a soldering iron. A set of nutdrivers and end wrenches will be useful in any mechanical assembly work that may be required.

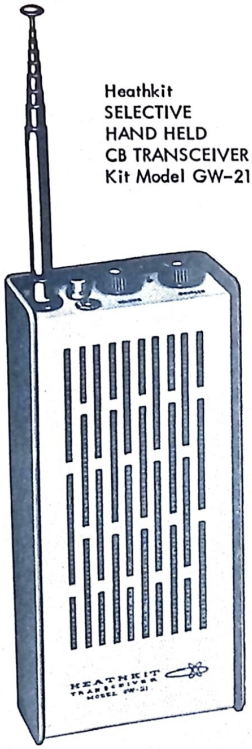
A good thing to know is what to do if you make a mistake. No matter how careful you are, there is still the possibility that you will break something accidentally or perhaps cut a lead too short. Many errors will be avoided if you will stop working as soon as you find yourself getting tired. Also, never allow yourself to work too fast.

If you cut a wire too short, splice a small piece of wire long enough to extend the cut lead to the proper distance.

If you break a terminal strip, you may still be able to make connections to the small hole below the broken pin. In this case, be sure that none of the bare wires touch the chassis. If the entire terminal strip breaks loose, you will have to replace it. Write to the kit manufacturer for an exact replacement.

Your work isn't all over when you have completed all the wiring. Now is the time to stop and check for errors in wiring and soldering. If possible, have someone else check

Heathkit
ONE-WATT WALKIE-TALKIE
Kit Model GW-52



Heathkit
SELECTIVE
HAND HELD
CB TRANSCEIVER
Kit Model GW-21

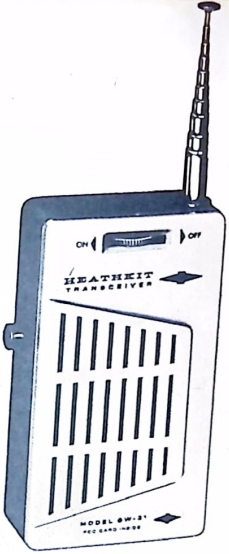
over your work. Let them make sure all connections are soldered and have them check your wiring with the kit instructions. Remember, it only takes one error to keep your kit from operating properly. Try to find all such errors before you turn on the power.

Here are a few troubleshooting hints. If the fuse in the equipment blows, it is extremely likely that there is a short circuit in the equipment. Try to locate the fault before replacing the fuse.

If the tubes all light but the set does not operate properly, check all voltage readings with a vtvm (vacuum tube voltimeter).

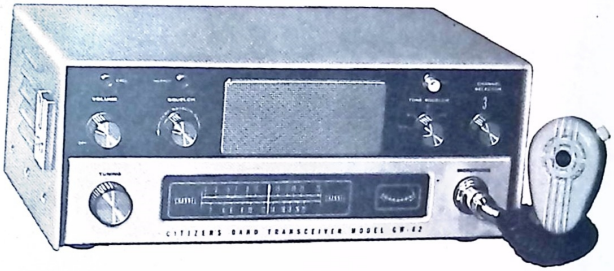
If you can't find the trouble yourself, write the manufacturer all the information on what happened—or what didn't happen—and what you did to correct it. Often the manufacturer will be able to solve the problem.

Should all else fail, return the kit to the manufacturer's service department. Obtain a sturdy carton large enough to hold the kit and place protective packing material around it. Make sure the device is packed securely so that it does not shake or rattle. Then seal the carton and mark it FRAGILE, DELICATE ELECTRONIC EQUIPMENT. Insure it for its full value and ship to the manufacturer via Railway Express.



Heathkit
HAND HELD
CB TRANSCEIVER
Kit Model GW-31

Heathkit
CITIZEN'S BAND
TRANSCEIVER
Kit Model GW-42



Heathkit
CITIZEN'S BAND
TRANSCEIVER
Kit Model GW-32

Assembling Your Kit

When you get your kit home, there are several steps to follow to successfully construct it.

1. Clear a suitable working area.
2. Carefully unpack the kit.
3. Check the parts enclosed against the parts listed in the instruction manual.
4. **Read the instruction manual carefully, from cover to cover.**
5. Follow instructions.

It's as simple as that.

If you have to stop work on your kit for any length of time, be sure to put it away carefully and in order.

Hints

Most assembly instruction books have detailed diagrams of the step-by-step construction of the kit. You might find it a good idea to mark off each wire or component on the diagram with a red grease-pencil as you connect it; this will show you at a glance what you have done already.

The component parts of the kit have longer connecting wires than is necessary, in most cases. When the book says to "cut lead 7 to ½ inch, and then solder into place," it would be a good idea to do just that. Keep all leads as short as possible. This not only makes for neater work, but improves the electrical performance of the apparatus.

Familiarize yourself with what each component part is. If an identification tag gets lost, you won't be left holding a small round object with wires coming out of it, and wondering if it's resistor R-17 or coil A-3.

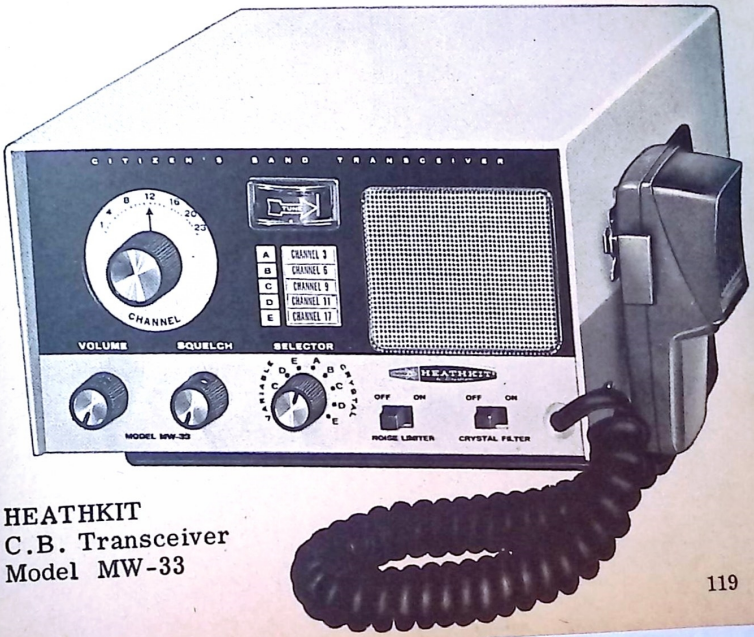
In order to obtain the best results from electronic kits, all lead lengths from components (resistors, capacitors, transformers, etc.) must be kept as short as possible. This includes all components and insulated wires. Bare wiring must not touch the chassis unless the instructions say it should.

The greatest cause of errors in kit building, next to improper soldering, is short circuits. Shorts occur wherever two uninsulated wires which are supposed to be kept separate touch one another. Shorts also occur wherever a wire going to one pin of a tube socket or printed circuit board touches another pin or some nearby part of the metal chassis.

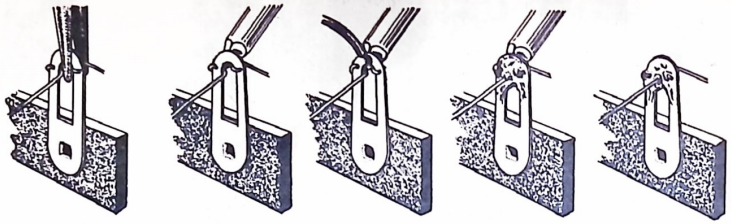
The main body of a resistor or a capacitor is normally fully insulated, so it does not matter if these parts do touch something. It is the bare wire on the ends of these components that can give you trouble. As you assemble more and more parts in

Heathkit
CITIZEN'S BAND
TRANSCEIVER
Model GW-12

Heathkit
CITIZEN'S BAND
TRANSCEIVER
Kit Model GW-11



HEATHKIT
C.B. Transceiver
Model MW-33



CRIMP WIRES HEAT CONNECTION APPLY SOLDER ALLOW SOLDER TO FLOW PROPER SOLDER CONNECTION

your kit, you will realize how easy it is for a short to occur.

In almost all kits a supply of insulated tubing called spaghetti is provided. Wherever you suspect the possibility of a short, slip a piece of spaghetti over the wire you think may cause trouble.

How to Solder

Most electronic construction kits have to be soldered. This seems to be the stumbling block for those people who experience difficulty in constructing a kit. By far the largest number of malfunctions in electronic kits are due to poor or improper soldering.

Soldering is not difficult. It takes only a little knowledge and a little practice to be able to solder connections competently.

For most wiring a 20- to 100-watt soldering iron, or its equivalent in a soldering gun is all you need. A lower wattage iron may not heat the connection well enough to cause the solder to flow smoothly; a higher wattage iron may damage sensitive electrical components.

Rosin core radio solder should be used. Under no conditions use acid core solder or a paste flux. **Most companies will not honor guarantees or factory service agreements when acid core solder or paste flux has been used to construct their kits.**

The tip of the soldering iron should be cleaned and tinned (covered with a thin coat of solder) before use. While using it, it should be kept clean by wiping it with a rag.

The steps in soldering are:

1. Cut wire to length.
2. Strip insulation. This should be done carefully so as to prevent breaking internal connections.
3. If the part to be soldered has no insulation on its wires, a length of "spaghetti" insulated sleeving should be put over the part of the wire between the joint to be soldered and the component to prevent it from coming into contact with any other wire or component.
4. Crimp the lead around the terminal to form a good joint. If you are unable to crimp it, position it so that a good solder connection can be made.
5. Place the soldering iron at the terminal to be soldered and heat the joint. Note that the joint, **not the solder,** is to be heated.
6. Place the solder at the hot joint and allow it to flow over and around the connection. Use enough solder to completely wet the joint, but do not allow a large lump of solder to form around the connection.
7. Remove the solder and the iron from the joint, taking care not to move the leads until the solder has set. This takes only a few seconds.

Following this procedure will give you a well-soldered joint. It is suggested that you practice with pieces of scrap wire for at least a half-hour before you start on the construction of the kit.

7. Meters into Kilocycles, and related information

Meters into Kilocycles

The length of a radio wave is proportional to its frequency. The length, measured in meters, is equal to the speed of the wave (radio is propagated at the speed of light) in meters per second divided by its frequency in cycles per second.
The formula is

$$w = \frac{v}{f}$$

where: w = wavelength in meters
v = velocity in meters per second
f = frequency in cycles per second

The speed of light (v), is equal to 300,000,000 meters/sec.

Antenna Length

The formula for computing the half-wave length of an antenna to be cut to a specific frequency is:

$$\text{Length in feet} = \frac{468}{\text{frequency in megacycles}}$$

OHM'S Law

One of the simplest electronic circuits is a battery with a resistor connected across it. A complete circuit must have an unbroken path. The values of current, voltage and resistance in such a circuit are interrelated. This relationship is known as Ohm's Law. Following are the three basic equations:

1. $I(\text{Amperes}) = \frac{E(\text{volts})}{R(\text{ohms})}$
2. $E(\text{volts}) = I(\text{amperes}) \times R(\text{ohms})$
3. $R(\text{ohms}) = \frac{E(\text{volts})}{I(\text{amperes})}$

All three formulas are used in all phases of electronic work. But remember that the quantities of the various elements in each formula are in volts, amperes and ohms. No other unit can be used unless they are first converted into these quantities. If the current in a given problem is given in milliamperes it must be changed to a fraction of an ampere before it is used. Use the following table to perform any necessary conversions. But first here are the basic subdivision prefixes for voltage, amperage and resistance.

micro = one millionth
milli = one thousandth
kilo = one thousand
mega = one million

TABLE OF CONVERSION FACTORS

From	To	Multiply by	Divide by
Units	Microunits	1,000,000	
	Milliunits	1,000	
	Kilounits		1,000
	Megaunits		1,000,000
Microunits	Milliunits		1,000
	Units		1,000,000
Milliunits	Microunits	1,000	
	Units		1,000
Kilounits	Units	1,000	
	Megaunits		1,000
Megaunits	Units	1,000,000	
	Kilounits	1,000	

K2US
Short-Wave Voice of the New York World's Fair

The finest three-position sending and receiving station ever built for world-wide amateur radio communication has been installed in The Coca-Cola Company Pavilion at the New York World's Fair.

Visitors to the exhibit will be able to watch and listen to amateur radio operators talking to their counterparts around the world from the Fair.

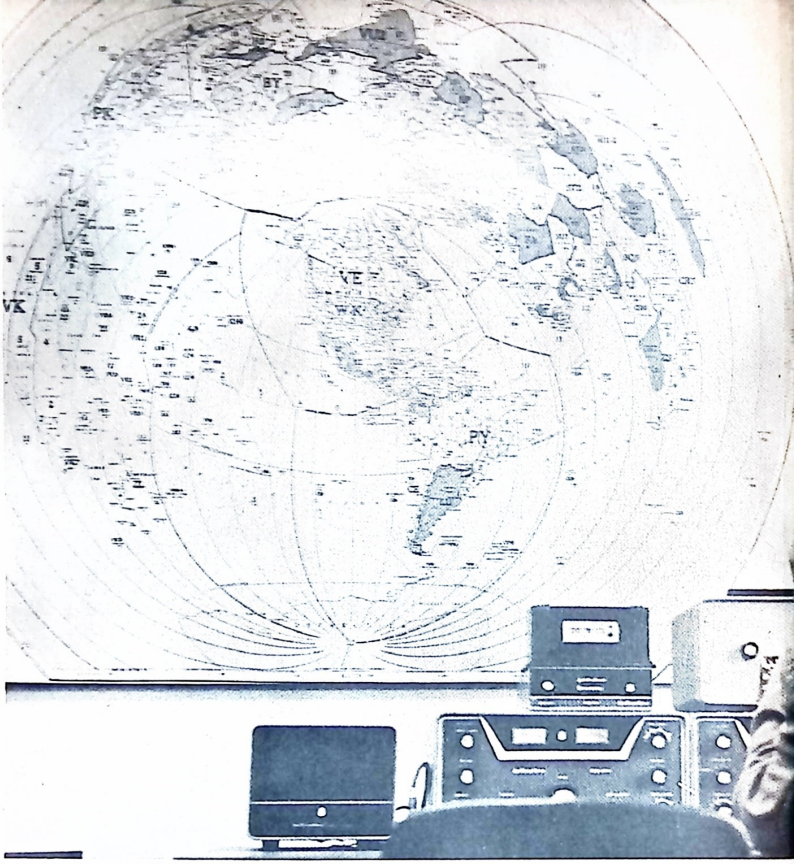
"Ham" radio operators anywhere on the globe will be able to tune in to the excitement and glamour of the World's Fair by contacting K2US, the special call letters assigned to the "shortwave voice of the Fair."

K2US, swung into high gear during the first weeks of its operation. From April 22, 1964, Opening Day, to September, the station played host to 6,500 licensed amateur radio operators, according to the guest book. 2,500 of the visitors participated in operating the station; the balance were content just to visit and watch the activity. On May 30, 1964, one of its busiest days, K2US had 59 different operators who made a total of 258 two-way contacts! Countless numbers of the public also visited K2US, watching and listening to the amateur radio activity from a vantage point outside of the large, glass-windowed area.

8,000 contacts were made during the first eight weeks of operating, among which were contacts sufficient for the amateur award certificates for WAS ("Worked All States") and WAC ("Worked All Continents"). Thirty-five countries throughout the world were contacted, among which were England, Germany, Venezuela, Tanganyika, South Africa, and Israel. Since K2US answers QSL cards on a received basis, 4,000 cards were sent out in response to requests. SWLs (short-wave listeners) were among those who requested and received the souvenir K2US QSL.

During the first eight weeks of operation, K2US made enough contacts to win the amateur awards WAS ("Worked All States") and WAC ("Worked All Continents").


US
K2US
hallicrafters
hallicrafters

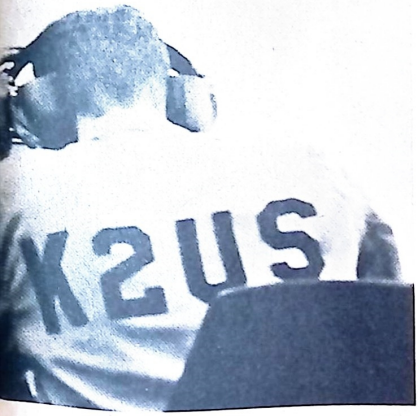


Any amateur radio operator who visits the exhibit will be allowed to broadcast from the studio after presenting a "ham radio ticket" or amateur radio operator license.

And if a glimpse of "ham" radio in action encourages visitors to learn more about it, educational information on this fascinating scientific hobby will be available.

Volunteer members of the Hudson Amateur Radio Council in cooperation with The American Radio Relay League will keep the World's Fair station on the air.

The American Radio Relay League is the national non-profit membership association for "hams" in this country. Herbert Hoover, Jr. is the president of the League. It was founded



in 1914 and will celebrate its 50th anniversary during the first year of the New York World's Fair. Headquarters are in West Hartford, Conn.

Public service is one of the American Radio Relay League's most important functions. Its "Amateur Radio Emergency Corps" forms a valuable nucleus of back-up communication for disaster work.

The "Radio Amateur Civil Emergency Service" maintains a series of national, regional and local networks ready to aid civil defense communication if needed.

A community program to coordinate citizens band two-way radio facilities for the common welfare... in the American tradition

9.

REACT was established in 1962 by The Hallicrafters Co. as a public service. Since its establishment, the organization has grown to well over 500 teams and 14,000 current, active members. The primary purpose of REACT is to serve individual communities by providing an organized local area emergency radiotelephone network to enhance, extend and supplement existing communication facilities through the use of Citizens Band Radio.

REACT does not replace in any way the organization of an existing club, nor does it interfere with existing routine; the club adapts REACT to its own procedures. Where no club exists, REACT may be put into effect immediately without complicated planning and wasted time.

REACT is a plan orientated strictly to local problems. There are, however, major advantages that stem from REACT's national organization. First, the national headquarters is in a position to accumulate information on new emergency techniques from hundreds of their communities and pass on to local chapters this valuable information.

Second, REACT National Headquarters, on behalf of local groups throughout the nation, can work far more effectively with other national emergency groups such as Civil Defense groups, Red Cross, American Radio Relay League (RACES program of radio amateurs, the official disaster network), military communications groups and in the President's Committee for Traffic Safety . . . in

coordinating proper use of citizens band radio in time of national emergency or major disaster.

How a local REACT team is organized

A local REACT team will be established in any community where citizens band owners exist and submit an application to National REACT Headquarters.

REACT requirements are short and to the point. There is a minimum of required organization. Its purpose is best served by confining its activities entirely to local emergency service. A local REACT team is organized and operated as follows:

1. National REACT Headquarters appoints a Local REACT Headquarters to coordinate all services.
2. A pre-membership meeting is held by interested individuals to establish the following essential structure:
   A. Election of officers (optional)
   B. Agreement upon a particular channel to be used exclusively or primarily for emergency calls (mandatory)
   C. Agreement upon a monitor station or station system capable of immediate response 24 hours a day, seven days a week. Monitors may be chosen to suit local conditions—individuals, taxi co., hospital, police, local REACT headquarters, or any combination thereof (mandatory)
   D. Establishment of membership list, list of local authorities and emergency services with their citizens band calls and telephone numbers
3. Application is then submitted by letter to National REACT Headquarters by the Local Headquarters, including all essential information agreed upon above.
4. Upon acceptance of a local REACT team's application, national headquarters will forward for member distribution (a) individual membership cards, (b) metalized REACT decals for vehicle identification and (c) periodic REACT bulletins from national headquarters.
5. A strong program of local publicity, prepared by National REACT Headquarters, then will be released to acquaint your community with REACT and its important service. There are no dues or initiation fees for REACT nationally.

All costs of the basic materials for the REACT program are borne as a public service by the REACT sponsor, The Hallicrafters Co.

QUICK REACTIONS FROM COAST TO COAST

... Texarkana, Texas: Arklatex REACT Club entire membership (29) has completed Red Cross first aid course. Team has purchased a used milk truck, being refurbished and equipped with complete emergency items ... Long Island, N. Y.: Nassau County Team recently commended by Nassau Medical Association for outstanding job of distributing polio vaccine on less than 12 hours' notice ...

Edmonton, Alberta, Canada: Our newest Canadian affiliate, REACT Centre of Edmonton, also is our fastest growing team — from 14 to 55 members in less than 4 months! U.S. visitors cordially invited to give them a shout while passing through "the gateway to the north" ... Jackson, Mich.: Brand new, 10 man REACT team in Jackson are 100% officers of the state prison — including the Warden! 24 hour monitor station is the office of the Department of Correction...

Pearisburg, Va.: Tri-County REACT is now the proud owner of an ex-aircraft observation tower, complete with wooden building on top. Structure is mounted on utility poles, gets our vote as most unique REACT headquarters in America! ... Middletown, Ohio: 10 members of Middletown REACT responded with flying colors to rush emergency call from fire department; provided mobile and portable communications between fire captain and fire fighters battling major blaze. Also furnished flood lights ...

Columbus, Ohio: Columbus REACT reports working out arrangements with county officials to have signs erected on all major highways leading into Columbus calling attention to "REACT emergency channel 9" ... Davenport, Iowa: Under authority of police department, Davenport REACT unit of 18 vehicles drastically reduced cemetery vandalism with organized night patrols ... West Milford, W. Va.: Louis County REACT recently was credited directly with saving the life of a woman taken seriously ill in an area without telephone service. Monitor contacted funeral home, which rushed an ambulance, administered first aid, reached hospital in time ...

STATEMENT OF *REACT* OBJECTIVES

1. To assist in all forms of local emergencies by furnishing instant radiotelephone communications with REACT headquarters and/or proper authorities and services.
2. To promote close cooperation with all forms of emergency radio communication in event of disaster.
3. To maintain and encourage operating efficiency through proper communication techniques on the air.
4. To operate and maintain equipment at peak efficiency and in accordance with F.C.C. regulations.
5. To promote use of agreed-upon, nationally recognized, channels for emergency situations only.
6. To co-operate in locating and reporting sources of radio interference in all radio service categories.

Approximately 20 per cent of the REACT teams now in effect are officially affiliated with a local Civil Defense organization, law enforcement organization, or both. Many fire departments also work directly with REACT teams. Membership will vary, of course, according to local conditions and needs.

For further information on REACT, write to:

National REACT Headquarters
5th and Kostner Aves.
Chicago 24
Illinois

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